A

LETTER

OF

FRANCESCO REDI

Concerning

Some Objections made upon his

OBSERVATIONS

About

VIPERS.



Written to

Monsieur *BOURDELOT* Abbot, and Lord of *Conde* and S^t *Leger*.

And

Monsieur *ALEXANDER MORUS*.

Printed in Italian *at* Florence, 1670.

Now made English.

Together with

The SEQUEL of NEW EXPERIMENTS upon *VIPERS*, and a Dissertation upon their *Poyson*: Serving for a Reply to a Letter written by Signor *Francisco Redi* to M. *Bourdelot*, and M. *Morus*.

Written in French *by* Moyse Charas.

Now likewise Englished.

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Written to

MONS. DE GRANDE BOT ABBOT

and Lord of St. Eligius.

Translated into ENGLISH.

Printed at Florence, 1670.

And Reprinted at London, and Sold by

A LETTER OF FRANCESCO REDI,

Concerning some Objections made upon his Observations about Vipers,

Written to

Monsieur *BOURDELOT*,

AND

Monsieur *ALEXANDER MORUS*.

SIRS,

FROM your liberality I have received the Book entituled *NEW EXPERIMENTS upon VIPERS*, learnedly composed by those noble *Virtuosi*, who during some months had met in the House of *M. Charas* for that purpose. I have read it over more then once with great contentment, plainly finding that those Worthy persons have not scrupled by their eminent labours to confirm the Truth of those Observations, which I also had made touching *VIPERS*, until the year 1664.

And indeed I think my self much obliged to their ingenuity, and do frankly acknowledge, that whatever worth that rude and plain piece of mine may have, it hath received it from the honourable testimonies, given to it in *France*, where all the excellent Sciences and Arts do highly florish, to the admiration of those that profess them in the other parts of *Europe*.

I intreat you, Sirs, that you would do me the favour to represent upon occasion these my candid and cordial sentiments, and withall to declare the high esteem I have for that Book; the authority of which is so venerable with me, that, having found therein some few things directly contrary to my own Experiments, I have often doubted of my self, and been almost ready to believe, that I dream'd when I made, and when I wrote them. But some of my Learned Friends, that were frequently present at those my Operations, have laughed at me for that proneness of my belief, and between jest and earnest assur'd me, that those Experiments had by no means so succeeded with me in a dream. Notwithstanding which, without any regard to their asseverations, I resolved to iterate

and

and reiterate them, and that with so great and careful diligence, that I should greatly injure my self and Truth, if I should not freely and candidly tell you, that all those four or five Experiments, which to those Gentlemen in *France* have not succeeded, do succeed with me in *Italy* without fail, as they were formerly recorded by me; on the contrary, those will not succeed with me that have been made in *France* and are contrary to mine.

And since you may perhaps have the curiosity as to desire to know of what kind they are, I shall here give you a brief account of them; assuring my self, that it will be acceptable to all the Lovers of Truth, but especially to the Authors of the Book of the *New Experiments*, who have been induced to write by no other motive then the sole desire either to confirm or to find the Truth of a matter so curious, of which so many understanding men have written.

In my Letter then of the *Observations about Vipers*, addressed to the Illustrious *Lorenzo Magalotti*, speaking of the Poison of those creatures, both what it is, and in what part of the Body it resideth, I af-

saved (as I affirm still) that the Poison of a Viper is no thing else then a certain yellowish liquor, which lodgeth in the vessicles that cover the greatest teeth of the Viper; and that that juice is not only poisonous, when it is injected by the live Viper when she biteth, but also when 'tis collected from a dead Viper, and even such as one that hath been dead many days, provided it be made to pass into a wound, and remain there. Moreover, I added, that this same liquor, when taken down into the stomach, is not deadly, no not so much as noxious. And this was my opinion, which hath been confirm'd to me by innumerable Experiments, made with the greatest exactness I could employ.

But the Authors of the Book of the *New Experiments* do resolutely write, That that abovementioned liquor is not poisonous, but a mere and most innocent saliva or spittle. Hence they go on to affirm for an undoubted and experimented Truth, that the Viper hath no part of her body, neither bile nor humor, able to poison, and that all her poison consists in the sole imagination of the Viper, irritated and made angry by the thirst of vengeance, which

she hath conceived in her heads by the means whereof the spirits being put into a violent motion, are darted through the Nerves, and sometimes through the fibres of the cavities of the Teeth, by which cavities those spirits are carried to infect the blood of the animal, by the opening made with the biting teeth. In theory, they conclude, that if a Viper be not angry, and have not that vindicative imagination, her bitings do never poison, but are very innocent, causing no mischief at all to him, in whom they are made. For these are their words, page 360. in the English Version, *These considerations supported by many Experiments made by us, and no lesse learned heads, have induced us to call these Glands Salival, and to ascribe to them the very sources of this yellow liquor, which hath been so much decried, and withal so little known, and to nothing else, but a pure and a very innocent Spittle. I hope that those who shall take the pains of examining after me, these Glands, and this Juyce of the Gums, will not stick to give me their suffrages.*

Item p. 105. 106. *But not to stay upon principles so slightly established, and ill maintained, forasmuch as we have on our side a great*

great number of Experiments, upon which we are grounded. We say, that this Juice is nothing but a pure and plain Saliva, of which we have already observed the use; and that this Juice contributes nothing to the venemousness of the Biting, since being rubbed and swallowed (as we have often experimented) it doth no hurt to what it beasts; and since also, being put upon open wounds, and upon incisions made in the flesh, the same being rub'd therewith, and mingled with the blood, it annoys nothing at all; notwithstanding the judgment of a Person very intelligent, and particularly in this subject of Vipers, who assures to have made a great number of Experiments, which being contrary to ours, the great opinion we have of the abilities and the sincerity of that famous man hath obliged us to employ the more care and exactness, and to confirm our selves by a very great number of Experiments, which have always been found alike to the truth we here assert, and of which we shall make evident and irrefragable proof.

Item p. 119. We conclude therefore, that the imagination of the Viper, irritated by the idea of revenge, which she had framed to her self, gives a certain motion to the spirits, which cannot be expressed, and pushes them violently,

through the Nerves and their Fibres, to the cavity of the teeth as into a funnel, and that from thence they are conveyed into the blood of the animal by the opening, which they have made there to produce all these effects, of which we endeavour to give a reason.

Item pag. 121. *However this be, we must herein agree, that this irritation in the fanfie or in the spirits of the Viper, is the main cause of the activity and piercingness of its venom, and that without it the biting would not produce such surprising effects, as these are, of which we have related so many examples.*

Item pag. 138. *These Experiments will prove on the one hand, that the yellow liquor contributes nothing to the poyson, and on the other, that these incensed spirits, assisted by the openings, which the great teeth had made for them, are the sole and true cause thereof.*

These sentiments they confirm by some Experiments, all which consist in this, that they had drop't a quantity of that yellow liquor into the wounds of a Pigeon, a Dog, and some Pullets, which yet dyed not of it: and that having caused a Pigeon to be bitten by a Viper not enraged, the animal received thence no hurt at all. For they say,

thy pag. viij. We also made a trial upon a Pigeon, which we wounded under the wing and in the Leg in the same manner as those; and in the two such wounds sprut of this yellow liquor, which just afore we had drawn from the gums of two enraged Vipers; then we injected the thin well, to enclose the said liquor, and we bound both wounds very strait, that nothing might run out. We can assure, that the Pigeon felt not any inconvenience from it, and that we could find upon the wound, made in the Leg, a singular drop of the juice, round, and of the same colour as we had put it there, and the blood of the wound dryed, and shut, soon after, both wounds were dried up, and healed of themselves.

Pag. 21. We also made the like Experiment upon a Cat, which we purposely wounded in the Leg, but he received no harm at all by it: We have also often experimented it on Rabbits, and other Pigeons, but always with the like success, and without any offence to the Animals.

Ibid. The same Trial hath been thrice made at three several times, and even twice in one day upon a Dog, whom we had wounded on purpose towards the bottom of the Ear, where he could not lick the wound, and no mischief at all followed upon it. Ibid.

Pag. 32. We cannot but take notice of the Experiments of the mortal effects of the Envenomed Spirits, without any intervention of the yellow liquor. We made a Viper several times to bite upon a slice of bread, by pressing every time its jaws to disgorge its teeth; and we did that so often, that not only that yellow liquor was altogether exhausted, but the blood began to come out of the Vessels. At the same time we vexed the Viper, and made her bite a Pigeon in the most fleshy part; and we observed that indeed the effects of the venom of the biting were much quicker. The Pigeon was dead in a quarter and half of an hour, as it had been bitten; but then we found also, that the teeth of the Viper were in a manner covered with the crums of the bread, from the force of her having bitten it; and that that had hindred them from being clean; and thus having half stop'd up the pores of the teeth, a good part of the envenomed Spirits could not come forth: so that the death of the Pigeon could not follow so fast, although perhaps without any mixture of that juice, which had been altogether emptied.

Page 32. The wound made by a Viper not dressed, whose Jaws were held in, and her teeth were at the same time thrust into the

the body of a Pigeon, which also was accompanied with store of the yellow juice, and yet not attended with any ill accident.

To these Experiments I have nothing else to oppose, but those very many ones, that were made by me in the year 1664. and recited in the above-mentioned *Observations* of mine *about Vipers*, and those also that I shall recite hereafter, made likewise by my self, not with a desire to confirm the first, but indeed to discover the Truth. And, that I may not be put often to repeat some things, I shall premise some General Observations, made by me at the time when I dealt in Vipers.

1. A viper more easily kills a Pigeon, a Rabbet, a Turky-cock, a Squirrel, a Dormouse, and generally all small Birds and Animals, than a great Animal, as a Sheep, a Deer, a Horse, a Bull; yea these greater ones and those that are of an hard skin, very often a Viper kills not at all.

2. According to the bigness of the Animal bitten, and according to the place where the Viper biteth, death follows sooner or later; especially according as the place wounded is a clear texture, or thick set with veins and arteries; or those veins and arteries are very small or big.

3. If

3. If from the wound of a Viper much blood issueth, it sometimes happens, that the Animal not only dyeth not, but does not so much as feel any great inconvenience.

4. It doth also not seldom fall out, that an Animal bitten by a Viper suffers grievous Symptoms from the poyson, which bring it near death, but yet kill it not; but the creature without any help of Physick and by the sole work of nature recovers.

5. Those Animals that are bitten of a Viper dye a little sooner, than those, into the wounds of which hath been on purpose conveyed that yellow liquor, which by art hath been fetch't out of the baggs of the teeth of that Viper.

6. 'Tis necessary, that great dexterity be used in making the said liquor to penetrate into the wound; because, if the wound be narrow, it pierces difficultly; if large, it cannot be otherwise but it will bleed, and with that blood the said liquor will turn back, and so the poison come out again.

I had then provided a good number of Vipers which I caused to be brought me out of

of the Kingdom of *Naples*; and having in this moneth of *May*, 1670 wounded ten Pigeons of the bigger sort in the thighs, I put into them some of the yellow liquor freshly taken out of the mouth of the five Vipers; and all these Pigeons, some within the space of one hour, some in half an hour, and some in two hours, died. This Experiment I repeated upon ten Chickens, likewise wounded in their thighs, with the same event that had befallen the Pigeons.

Then I cut off the heads of twelf Vipers, and all the heads being cut off, and the Vipers quite dead, I thence extracted the poyson, and caused them to be put into the wounds of eight Turtle-doves, all which died in the space of half an hour.

In the month of *June*, having killed many other Vipers, and gather'd out of the bags of their teeth and their gums all the yellow and viscous Juice that was there, I anointed therewith some besom-rods, sharpn'd like arrowes, and immediately I pricked with them ten young Pigeons in the more fleshy part of their chest, leaving them fixed in the wound; and the Pigeons survived not above two or three hours. But lest it should be doubted, whether these Pigeons died not

of the wound it self, enraged by the punctures of those rods. I made a trial upon four other Pigeons with rods not infected with that poysonous liquor; but none of them dyed, though the wounds became purulent.

I also took eight heads of Vipers, cut off six hours before, and, the Vipers being quite dead, I caused eight Turtle-doves to be bitten by them in the thigh, and not one of them escaped.

Moreover I made the heads of fifteen Vipers to be cut off, and put them into a glass-vessel well cover'd, having laid them upon one another, that so they might remain moist. Four dayes after, I struck with those heads five young Cocks, and five great Pigeons in the thigh, and they all after a little while died. The like fell out with other Viper-heads, which having been killed six dayes before, had in all likelyhood lost all choller and thoughts of revenge. And to prevent all Objections that might be raised on this occasion, I shall not omit to relate to you, that about the beginning of *August* when two of my Vipers, that alone were left me in a box, died of themselves of sickness, I caused two Turtle-doves to be struck

by them, which also, like the former, dyed in less than an hours time.

But I may go further. I had collected in a glass all the poisonous liquor of the heads of two hundred and fifty Vipers, to make various Experiments therewith upon occasion. But being by much business hindred, I delayed to accomplish my design: Whence that liquor turn'd first into a glew, colour'd like amber; then in 30 dayes it became altogether dry and friable, so that it could easily be reduced to powder. Being pulverised, I had a mind to try, whether that powder, let into a wound, did keep the force of poysoning; and I found that really it did so, all those Pullets, Pigeons, and Turtle-doves, into the wounds of which I had put some thereof, dying of it in a little while.

Having made this Experiment, I began to doubt, whether that poyson of the arrowes of the King of *Macassar* in the Island of *Celebes*, which commonly are called the arrowes of *Bantam* in *Java Major*, were not the poyson extracted out of the mouth of some Viper, or of some other Viper-like serpent, and perhaps of a more maligne nature because of the diversity of the Climate.

I am not much averse from believing this to be so; and it may be confirmed by what I have read in *Pliny*, *viz.* That the *Scythians* did infect their Arrows with a Viperin poison. His words are, *Scythæ sagittas tinguunt Viperinâ sanie & humano sanguine: irremediabile id scelus, mortem illico ictui tactu affert.* And this was perhaps extracted by *Pliny* out of *Aristotle*, who in his Book, intitul'd Περὶ ἀκουσμάτων, soon after describeth the process of preparing it, which I dare not affirm to be the true one, or to require so many circumstances and cautions. And who knows, whether the Arrows of *Hercules*, of which the Fables alledge that they were imbued with the blood of an *Hydra*, were not infected with this poison of Vipers? So 'tis believed by *Diodorus Siculus*, when he saith, Τὰ βέλη τοῦ Ἡρακλέους ἐπιφανῆ γενέσθαι. And *Ovid* gives the name of Viper to the *Hydra*, when in his ninth Book of *Metamorph.* he saith;

Pars quota Lernæa serpens erit una Echidnæ.

And afterwards;

——— *Caput insciæ heros,*
Induitur pharetræ, Lernæa virus Echidnæ.

To which may be added, that *Philoctetes*, the Heir of the Bow and Arrows of *Hercules*, being gone in the Grecian Navy to the *Trojan*

War, and having unawares wounded himself (as *Servius Grammaticus* relates, *l.* 3 *Æneid*) with one of his Arrows in the foot; was left among the Grecians in the Isle of *Stalimene*, by reason of the violence of the pain, and the intolerable stench of the wound. Whence *Sophocles*, alluding, it seems, to the kind of poison, in a Poetical way and phrase relateth, that *Philoctetes* was left in that Isle, because he had been bitten by a Viper. His words are;

Ὦ παῖ, σὺ μὲν σοῦ τοῦ Ἀχιλλείου
Ὁ δ' ἐγὼ ἐγὼ σὸς πατὴρ, ὃν πάντες ἴσως
Τῶν ἐμπροσθεν ἔτην Ἡρακλείων ὅπλων,
Ὁ σῶν Παιαντοῦ παῖς θαλασσίους ἐν δὴ
Δεινοῖς τρόποις χὠ Κεφαλλήνων ἄναξ
Ἕλκους ἀμηχάνοις δὴ ἕρμασιν, ἀγρίᾳ
Νόσῳ πλαδώσαντες, τὸν δ' ἀνδροκτόνου
Πικρᾶς ἰχίδνης ἄγριον χαράξασαι: *That is*

O Son of Achilles, *I am he, whom thou mayst have heard to be the possessor of the Herculean Arrows, the Son of* Pæan Philoctetes: *whom the two Armies and the King of the Isle of* Cephalene *shamefully left lying here, pining away by a cruel disease, struck by the fierce bite of a murthering Viper.*

And *Cicero* himself in his second Book of the *Tusculan Questions*, and in his Book *De Fato*, and many other Writers do follow this opinion, *viz.* That *Philoctetes* was bitten by a Vi-

a Viper. And possibly all of them had an eye not only to this place of *Sophocles*, but also to what *Homer* said before, in his sixteenth Book of *Iliads*.

And though against this conjecture it may be said, that the poison of Vipers is inconsiderable in respect of what Poets do write of the Arrows of *Hercules*, which by them are said not only to have the force of killing without fail, whether the wound be small or great, as happen'd to the Centaure *Chiron* and to *Nessus*; but also that the blood of their wounds was become so pestiferous as to infect any live body whatsoever, touched thereby, and that with such violence, as to make the flesh fall off from the bones: which, *they add*, was experimented by *Hercules* to his great mischief, when his Shirt was tinged with the blood of *Nessus*; whence *Ovid* saith,

Vitâ a malis postquam est patientia, repulit arma
Implevitque suis nemorosum vocibus Oeten;
Nec mora, letiferam conatur scindere vestem;
Qua trahitur, trahit illa cutim (fatumque relatu)
Aut haret membris, frustra tentata revelli,
Aut laceros artus & grandia detegit ossa;

This is a Poetical Fable; whence, I am apt

to believe, is raised that relation concern-
ing the Arrows of *Mexico*, of which 'tis
said, that they kill one in that very moment
he receiveth the lightest wound thereby, and
that also in the space of half an hour the flesh
of the killed person becomes so putrified,
that it falls off from the bones in many pieces,
whence do exhale such virulent steams, that
if they light upon any ordinary and not envi-
nomed wound, they mortally infect it, and
without fail kill the Patient.

I do here affirm, that I have made many
tryals with those Arrows of the Indians, but
have not found them in *Tuscany* of so fierce
and malignant a nature, as hath been related.
The Dogs I wounded with them, dyed some
of them in six, others in seven, others in
twelve, others in twenty four hours. And
their flesh was not putrified, nor fallen in
pieces, nor did their blood or exhaled steams
at all kill other wounded Animals. But I
have often observed, that, if one intends to
kill with these Arrows, it is not enough to
make a simple incision of the flesh, but he
must by art make them stick a while in the
wound (which is like to what happens in
putting into wounds the powder of the dry-
ed yellow liquor of Vipers:) Whence it is
that those Savages make of Wood the sharp

ends of those Arrows, imbue them with poison, and then joyne them to the Arrow stick in such a manner, that those ends ever remain in the wound, whether the Arrow do break or be drawn out; as came to pass in the Siege of *Jerusalem* to those Heroes of *Flanders*, *Godefred* and *Robert*, of whom that great Florentin Poet thus singeth:

Scoppiogvà il mantion, quando è percosso
Al Sig. de Fiandra, hi il lato manco,
Si che travia d' allhora, e vuol pur trarne
Lo strale, e resta il ferro entro la carne.

That is,

The Engine discharged, the left side of the Flandrian Princes was so struck, that they were thrust out of their way, and when they would draw out the Arrow, the Iron stuck within their flesh.

It is therefore necessary, that the Arrows do stick for some time in the wound, if they shall kill. Whence I understand not, how the vulgar comes to fansy, that the Blades of Swords may be envenomed. I do well remember, that with the yellow liquor of Vipers, and with other things esteemed venomous, I have sometimes slightly tinged Lancets for letting of blood, and with them have cut the vein of some Animal or other, but death hath not followed upon it. Let suspe-

ding men rather beware of the Tents of Chirurgions; for 'tis too hard to cause death by poison'd Lancets or other such Iron instruments. Hence it seems to me to savor of the fable (though the case be different) that *Parisatis* the old Queen of the Persians, did poison her Daughter-in-law by the hands of her Carver, poisoning the one side of the Knife, and therewith cutting asunder a Fowl, of which he gave to the young Queen to eat that part, which the poisoned side of the Knife had envenomed, eating the other part himself.

I could never see the truth of what is related of poisons killing by a meer and momentaneous contact, or by vicinity alone; as that Stirrups, Sadles, and Benches have been poisoned, and thereby proved mortal. Let him believe it that will; I cannot. And what a certain modern Writer relateth for a great truth, concerning a prodigious accident hapned by a kind of Serpents bred in the Indies, I must leave to himself, who saith, *After I have spoken of these Serpents, I presume it will not be unacceptable to give an account of the strange effect they produce. If perchance it happen, that they pass over a cloath or shirt dryed in the Sun, there is wont to be bred in the Kidneys of those that use this cloath, a certain*

kind

kind of Serpents, which little by little growing up do encompass the whole body, and when their tayl reaches their head, to conjoyn the circle, then death is unevitable: Wherefore, to avoyd this misshief, they kill them with Razors and Lancets, to prevent their growth.

You have found above mentioned three persons, wounded by the Arrows of *Hercules*, namely *Chiron*, *Nessus*, and *Philoctetes*. The two first dyed suddenly; the third, after a long sickness escaped. If the causes of this difference were to be given (whether it be an History or a Fable) I should say, that *Nessus* and *Chiron* dyed, because they were wounded whilst *Hercules* was yet living, by Arrows freshly envenomed; besides that *Nessus* was piereed through his heart, as *Ovid* hath it,

Flumque tenens ripam missos cùm tolleret arcus,
Conjugis agnovit vocem, Nessoque paranti
Fallere depositum; quò te fiducia, clamat,
Vana pedum violente rapit? Tibi, Nesse bisormis
Dicimus, exandi, nec res intercipe nostras.
Si te nulla mei reverentia movit; at orbes
Concubitus vetitos paterant inhibere paterni.
Haud tamen effugies, quamvis ope fidis equinâ,

Fulmen, non pedibus, te consequar. Ultima dicta

Re probat, & missa fugientia tergore figit.

Tingitur ecce cruor ferrum de vulnere sequens.

Quod simul evulsum est, sanguis per utrumque foramen

Emicuit, missus Lernæi tabe veneni.

But *Philoctetes* was wounded long after the death of *Hercules*; whence 'tis credible, that those Arrows had loſt much of their poiſon-ous force, even as the powder of the yellow liquor looſeth of its force, and the Arrows of *Macaſſer* by length of time grow languid; which though they poiſon and kill if one be wounded therewith, yet do they not hurt at all, if their poiſon be ſwallowed and taken into the ſtomach. Which Experiment I have tryed upon two Doggs, to whom I gave to ſwallow two pieces of fleſh covered with the powder of the ſcrapings of ſuch Arrows; as alſo upon ſeveral Chickens, to which I gave the water to drink, wherein thoſe ſhavings had been a long time infuſed.

But, to return after this long digreſſion to the main thing; you may by the above related and often repeated Experiments, ſee, that the poiſon of the *Italian* Viper conſiſts not in an imaginary *idea* of anger to ſeek to revenge, but rather in that yellow liquor,

which is voided out of the bags of the bigger teeth of Vipers, which juyce if it chance to be spilled in the mouth and upon the Pallat of those animals is able to envenom the spittle which moistens their throat.

I should think it very well worth while for those learned Authors of the book of the *New Experiments*, that they would please to make their Experiments anew. And if they shall find them conform to those they have already published, and really contrary to mine, then we may unanimously conclude, that we have lighted upon a truth hitherto unknown, which is, That the Poison of the *French* Vipers consists in an imaginary *Idea* of a revengeful anger, but that of the *Italian* ones hath its seat in that yellow liquor, so often mentioned by me. But if on the other side, the *French* Experiments should not hold, then it may be affirmed, that the *French* as well as the *Italian* Vipers are of one and the same nature, and have the same kind of poison.

Wherefore if in *Italy* the Viper's poison certainly lodges in that yellow liquor, it will be no unreasonable thing to affirm, that if by chance a Viper should have lost all that juyce residing in those bags, and that also which may be furnished by the neighbouring parts, it

will

will, I say, be no untruth in me to affirm, that the subsequent bitings will not be mortal: which is the thing I have these many years asserted, and do still assert, although the abovesaid Authors deny it, giving out that one only Viper, being vexed and swell'd with choller, is able to kill as many animals as she bites: they trusting to one Experiment, in which they say there died five young Pidgeons by the biting of one only Viper. *We hope* (say they, p. 137.) *that among the many Experiments those of the five Pidgeons, bitten one after another, by one and the same viper exasperated every time, and of which the last bitten died first of all, when the viper was most vexed, and most exhausted of its yellow liquor*, &c.

I am willing indeed to believe the fact to be true; but for the confirmation of it I wish they had caused many more such Pidgeons, and many other animals, of different kinds and bignesses, to be bitten of the self same Viper, which had killed those five ones, to see whether that angry and cholerick poison had an infinite power. For when I examin'd this matter, I chose about the beginning of *May* a Female Viper, one of the biggest and lustiest, and vexed her to bite ten Chickens one after another, in the right thigh; of which

the

the first, second, and third died almost in an instant; the fourth seemed only to be sick; but the fifth and all the rest did not only not dye, but were not at all sick; and yet every time the Viper did bite, I angred and maddened her exceedingly. In the month of *June* I repeated the experiment in five tame *Ducks*, bitten by one and the same Viper, which also immediately after bit three young *Turtle-Doves*. The first wounded Duck dyed three hours after; the second, five hours after; but the rest escaped. 'Tis true, that the first wounded of the Turtles dyed, but not the other two. Of twelve *Ring-Doves* at one time there dyed but four; but the next day of twelve others there dyed six. Of five *Rabbets* there dyed three; and of three *Lambs* the two last lived, the first of them dying two hours after it had been bitten.

I should be too tedious, if I should relate to you all the other experiments: Wherefore I shall go on to add, that having written in my *Observations*, that that yellow liquor was not conveyed to the bags of the teeth from the bladder of gall, I did suggest, whether it might not be disgorged there by certain several *Ductus's*, that might be inserted at the head of them; which did appear the more probable, because that in all Vipers at the

bottom

bottom of those vesicles I had always found two glandules, which had not, that I knew, been observed or described by any body. Whereupon the Authors of the *New Experiments* do affirm, that they could never see such Glandules as I had named; but that instead of them they had found two others, which they call Salival, thus by them described, p. 31, 32. *I believed at first, following Signor Redi, that there might be Salival vessels in Vipers, as there have been lately found in Man and divers other Animals; so that after many researches made with sufficient attention and patience, in many Vipers heads I discovered at length small Glands, proper to forme this juice, and to convey it to the Bags; and after I was well perswaded of it my self, I shewed them to divers of those learned Physitians, that had met at my house the last year. Those persons had occasion to see them with their own eyes, and after I had well examined the parts which I shewed them, they saw clearly that they were not the same I had described, but they discover'd a greater number of smaller vessels then that appear'd, of which four that are Arteries and Veins, pass along the Gland, and above that are Emulgents and Veins; so that they judged, that I could not sufficiently assure and describe these Glands which I call Salival, and which they hold to be Ligaments, and other such motion*

me;

me ; though Signor Redi dare not speak positively of them, because he had not discovered them : neither had they been described by any Author of their knowledge, nor by any one of mine.

And pag. 38. As to the small Glands, which Signor Redi hath observed at the bottom of the Vessicle that contain this juice, I can say, that I have with great care and diligence searched after them, and that 'tis true, I have there found the appearance of Glands, but having opened them, I saw nothing in them but small teeth that were fastned there, without finding any thing of a Glandulous nature there, nor that did in the least approach to the shape, substance, or qualities of the Glands which I have been describing, &c.

I do not at all wonder, that those Writers have not found those Glandulæ I named, in seeing they went about to search them within the Holes of the teeth, and at the bottom of them ; Whereas I never said that they were to be found within them, I said they were to be found Sotto il fondo (under the bottom) of those bags, and in good Tuscan language, 'tis another thing to say nel fondo (in or at the bottom) and then Sotto il fondo (under the bottom) And therefore when they sought them where they are to be met with, they easily found

found them, and they are the same which they describe, neither are there any other considerable glandula to be discovered in the heads of Vipers. Nor could I at all write that those Glandula lay in the bottom of the Vesicles, if I was of opinion that the yellow liquor did run into them after it had passed through the Salival Conduits; which yet I imagined might have their origin from, or connexion with those two Glandula seen by me, and therefore must needs be in a scituation a little distant from the Vesicles, and not in the bottom of them. Now whether these Glandula have this office and this use, I intend not now to speak of, let it be what it will, 'tis too inconsiderable a matter to make any more words of it.

I confess, that the dangerous experiments which Vipers have made them so displeasing to me, and even so odious, that I resolved not at all to meddle any more with them; but that I was tempted thereto by a great desire I had experimentally to learn, whether the volatil Salt of Vipers, Chymically prepared, were endowed with that present and infallible vertue of curing the bitings of Vipers, as the said Writers affirm. For my *Genius* keeps me from much trusting to those things, that have not been made out to me by Experiment; although I do not presently reject them

them as false before Experiment, but rather being desirous to know whether they be true, I put them to tryal: But neither do I acquiesce in one or a few experiments, but I love to see more and more, being ever apprehensive lest I should be deceived; as it often hath happen'd to me, when I have been ready to confide in one hasty experiment. And to say truth in the moneth of *June* there wanted not much but that I had imposed upon my self in the tryal of an experiment, which I am going to relate to you, and which done I shall ease you of further trouble.

Having read them in the Book of the *New Experiments*, that the Head of a Viper, being eaten of an animal, bitten by another Viper, did certainly cure the wound; and the thing being by me looked upon as very useful, excellent, and admirable, I had an eager desire to try it my self, that I might speak of it with more confidence, although those learned men had made these two following experiments of it, *viz.* pag. 120. *We had also a desire to find whether a Viper being eaten by an animal, which she had bitten before, would be cured of that biting. We therefore caused to be slightly broiled the head of a Viper, which had on it a part of the neck, newly sever'd from the body; and we caused a Dog to be thrice bitten at the ear, by a well enraged*

enraged Viper, in such a manner that the blood came out at the three pricked places. We soon cast before him the head and neck broiled, and got hot. The Dog, that was hungry, and felt not so soon the effects of the bitings, immediately seized on the head, bruised it between his teeth, and swallowed it down. After which we stay'd a pretty while to see, whether the three bitings would prevail over the devour'd head and neck: but the Dog was free, except some blemness and a little Tumour he had at the places bitten, but which little by little vanisht in three or four days. We made also a Dog to be bitten three times in the same place, and without broiling the head of the same Viper that had bit him, we cast it before him, hoping that he would eat it, because he had not eaten any thing for many hours before; but the Dog would not touch it. Upon that we bruised and stamped that head in a mortar, and so cast it down the Dog's throat, rubbing also the bitten places with the blood of the same Viper; which done, we expected the success, which was, that this head, raw and bruised, and if you will, assisted by the blood of the Viper, being applied to the part bitten, had produced the same effects with the former, which had been slightly broiled; in regard that this Dog was safe, excepting those inconveniencies the former suffer'd, and was after that as sound as if he had never been bitten.

If

If these two Experiments had been made before that Gentleman, above discours'd of, was bitten by a Viper, we should have been in much less anxiety for his preservation.

And a little before (pag. 119.) they had said: *We have tryed, that having caused to be bitten at the thickest place of the ear, by a sufficiently vexed Viper, a young Cat, very lean, that had but just before eaten the Eggs, the Matrix, and all the Guts of a Viper; the biting had almost no effect, and there appeared nothing but a very little swelling, and a very inconsiderable lividness in the part bitten.*

And pag. 154. *It is very certain, that the Head of a Viper, broiled and swallowed, healeth the biting of that Animal. The Heart and the Liver may do the same. Reason and Experience have confirm'd it; and therefore in an urgent occasion these parts may be very beneficially employed.*

And pag. 156. *We believe, that the Liver swallowed is capable to heal the biting of a Viper, like the heart, flesh and other parts of which we have spoken; and that it may much facilitate the delivery of Women with Child, as doth the Liver of Eeles.*

Hereupon I resolved to imitate those Gentlemen, and having given a Vipers head half boiled to a chain'd young Dog, I caused him

immediately to be bitten by an other Viper in the right ear, but the Dog dyed not, nor did he appear to me to have any other inconvenience than that he stood as 'twere amazed, and looking grim, and melancholly, for four or five hours space. I soon reiterated the same Experiment upon another Dog, which having been forced to swallow the head of a Viper, raw and bruised in a Mortar, gave no sign of any great poison, and had very little and almost no ill ensuing. Whence I was ready to reckon this Experiment among things proved and true, when a doubt coming into my mind, obliged me to cause two other young Dogs to be bitten in their ears, who although they had not eaten the counter-poison of a Vipers head, yet dyed not. Whence the suspicion being increased in me, I caused to be brought me the raw head of a Viper, and crammed it into the throat of a young Pullet, and then had its left thigh bitten by a Viper; whereupon it presently fell to the ground, and in a little more then the eight part of an hour died. Whence the suspicion growing still greater, about ten a clock in the morning I made a Capon to eat two raw heads of Vipers, and afterwards about twelve a clock I made him swallow two others, and without losing any time I caused him to be once

bitten

bitten by a Viper in the thigh, and the Capon immediately dyed, without finding any good in the four swallow'd heads. The next day I prepared for two young Dogs a dish of Viper-heads parboiled, but they would not eat them, and we were forced to cramm them down: Soon after, the lesser of the two Dogs was bitten in the thigh near the groin, and the bigger in the tongue, and they both dyed. And in the like manner dyed eight Chickens, two Kitlings, two young Hares, and six Turtle-Doves, likewise bitten by Vipers, and Physiqued not only by their heads, both raw and boiled, but also having their wounds washed with the Viper-blood. And I remember, that I caused those 6 Turtle-Doves to be bitten not by the heads of live Vipers, but by those of dead ones, and such as had dyed two days before. Moreover, I continued for three days successively to cram two such other Doves with Viper-flesh, and gave them no other drink then the broth of that flesh; and yet they could not escape death, being bitten by a Viper.

Whence I am inclined to believe, that in *Tuscany* the flesh of Vipers is no help or remedy, at least no considerable one, to Animals bitten by Vipers. Mean while I refer my self to the Learning, Experience, and Authority

of those noble persons, to whom I do most willingly submit this or any other opinion of mine, and with whom I would never entertain a controversie. For I should apprehend (lest it might befall me) what *Marcus Tullius* was wont to say of *Cato*, viz. That it was not less troublesome to him to answer to the authority of *Cato*, than to his strongest arguments.

For the rest, I earnestly intreat you, *Sir*, that you would pardon the rudeness of this my Letter, sufficiently appearing to have been written by a person full of business, rather then enjoying leisure; and that you would please only to regard the naked truth, which without any passion I did undertake to relate.

A CON-

A CONTINUATION
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NEW EXPERIMENTS
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VIPERS:
TOGETHER
With a Discourse touching their Poyson: By way of Reply, to a Letter written by Signor *FRANCESCO REDI*, to Messieurs *BOURDELOT* and *MORUS*; Printed at *Florence*, 1670.

By *MOYSE CHARAS*.

English'd out of French.

LONDON,
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A CONTINUATION Of the NEW EXPERIMENTS CONCERNING VIPERS.

Extract out of the Press at Paris, *August 4.* 1671.

I Believed, I had sufficiently established my opinion touching the *Eyes of Vipers* by abundance of Experiments, supported by Reasons, heretofore made publick: But there hath since appear'd at Rome a Letter of Signor *Redi*, in which he opposes my sentiments: And he being a person, whose merit hath acquir'd him a great reputation among the Learned, that Letter of his hath not been without making some impression in the minds of many, and in some even of those, that had relish'd my opinion, in

favour of which they seem'd to have already declared themselves.

I might indeed have defended my self as to that which is against me in that Letter, soon after it appear'd; having reasons strong and numerous enough to maintain and justifie all I had advanced in my writing: But I thought it better to deferr it till Spring, to the end that after I should have made New Experiments, and the more assur'd my self of all, I might, by a renew'd knowledge of the truth, afterwards the better perswade the publick thereof. It will therefore appear by this Sequel of Experiments, here set down, that I am so far from changing my Opinion, that I have reason to be more strongly than ever confirmed in what I embraced at first.

I do herewith sincerely declare, that when I published my Book, my chief aim was faithfully to relate all the truths I had discover'd, and not to offend Signor *Redi*, whom I exceedingly esteem and honour for his rare Talents, and whose friendship I hope to have a share in: so far was I from pretending to do any thing that might make him write against my Book, or from fore-seeing that ever I should have occasion to labour to defend my self against him: which yet I since found otherwise, by the Letter he hath written

ten

den against me, and even without honouring me with a Copy of it, wherewith he hath gratified many persons at *Paris* and elsewhere, several after I had had the advantage of some Literary Commerce with him, as I might easily justifie.

I can besides protest, that when I resolved to contradict certain points of his first Letter, it was in a manner against my will, and because I could not at all dispense with it, except I would have baffled my senses, and that light I saw my self together with a great number of whereof I can also assure, that I should now be very ready to say what I have affirmed upon this subject, and to agree with him, if I were not altogether perswaded of the contrary in the main things he hath written against my sentiments.

After these Protestations, being well assured as well by Reason, as by many new Experiments newly made, that I have affirmed nothing but what is true, I found my self indispensably obliged to maintain it, and to render a good office to the publick, by endeavouring to shew that it is very difficult reasonably to oppose any thing to the contrary.

The difference between Signor *Redi* and me consists chiefly in this, That he Pretends, the Yellow Liquor contain'd in the Vesicles

of

of the Gums of Vipers, to be the only and true seat of their Poison; That this juyce is not venomous when taken at the mouth, but that it is so when let into the wounds made by a Viper, whilst she is alive, and even in those, which she may be forced to make even two days after she is dead, provided that yellow liquor do intervene; That the same liquor drawn from a live Viper, as well as that of a dead one, is always venomous if let into wounds, and mingled with the blood of the Animal wounded, whether it be used when fresh, or after it is dryed and reduced to powder; and that it generally kills all kind of Animals into the wounds of which it shall have been introduced.

Now I, when of all these points can admit of none but that of the innocence of the yellow liquor when taken at the mouth, and opposingmy self to all the rest, do say, That the Poison of a Viper is no where but in her gums and spirits; that the yellow juyce as well of a live Viper, and even a roasted one, as of one that is either newly dead, or hath been so for several days, contains in it no poison at all, neither in the biting, nor taken inwardly, nor put into wounds, nor mingled with the blood, nor any other way wherein it may be used, that it kills not infects any kind of ani-

mals

make; and that it is nothing but a meer and
innocent Solution.

The question must principally be decided
by matter of Fact; though it may also be
cleared by very pertinent reasons. I am fa-
miliarly acquainted with Signior Redi, and
his Experiments; though they are not made
in publick as mine, and that some things might
be said as to the principles of the hunting, and
throwing off the yellow liquor, his reproach
is not well grounded to be blamed; and
this is the consideration which troubles him
most. Meanwhile I see the contrary to what
he hath advanced against my Solution: and the
truth which I there oppose is so clearly
set in my Experiments first and last, as well
in those I have made only in the presence of
some curious persons, as in those I have lately
made in publick, and before a great num-
ber of Physicians and other persons very in-
telligent in these matters. So that I can hard-
ly think any longer to hide these truths, which
are the chief inducement of writing this dis-
course.

We need not wonder that Signior Redi, hav-
ing made all his Experiments by order and
at the expence of so great a Prince, who is as
curious as he is Munificent, had Vipers and
all sorts of Animals in far greater number than

I

I had; I, who did all from my self, at my own charges, and with a meer desire to discern truth from falshood. Nor do I think, I was obliged to multiply expences when the truth was found sufficiently clear'd up, and all the by-standers acknowledged, that I had made sufficient tryals for every Experiment. For since he hath contented himself with having made some of the yellow liquor to be swallowed by one only Man, one only Duck, one only Kid, thence to know and to assure himself of its innocence when swallow'd, without making a greater number of Experiments; He must not blame me for having candidly bounded my curiosity, after I had in divers things made many more Experiments, then he mentions he hath made upon this subject; as appears by what he writeth p. 17, & 18. of his first Letter. I find therefore, that he hath no great cause to complain of me (as he doth, under the name of *these Illustrious Authors*, to whom he ascribes my Book in his Letter) for not having vouchsafed to make Experiments enow to confirm the truth of the Observations about Vipers, contain'd in his first Letter of 1664. He had not, I say, great cause to speak of it after such a manner, since I did do so but in imitation of him, and because he had in the same Letter advanced and asserted

par-

particulars, which required not I should make more tryals then those I have described in my Book: Although I can assure to have made more then I have recited. He knows very well, that about the end of pag. 23. of his first Letter he used these words.

E quel veleno sbizza tutto fuora, se non al primo, almeno al secondo morso; si che il terzo (e più volte l'ho esperimentato) non è velenoso: That is, *And that poison issues all out, if not at the first, at least at the second biting; so that the third* (which I have often experimented) *is not venomous.*

And if, because of the respect I bear to the writings of a person of so high a reputation, I thought among divers other Experiments, that having made one and the same Viper, every time vexed, to bite five several Pigeons, which all died, and even the last of them sooner then the rest, I might stop there; I think Signor *Redi* hath nothing to reproach me with. He had assured in his first Letter, and assures the same in his latter, That all the poison did lodge in the yellow liquor, and that this poison was all exhausted if not at the first, yet at least at the second biting, and that he had often experimented that the third was no more venomous: So that, if I was perswaded, that all the yellow Liquor must be

come

come out by the second biting made upon the second Pigeon, and if, after that, I have seen dye three other Pigeons by the fresh bitings of the same Viper that had bitten the two first; I do not think that Sign. *Redi* hath right to accuse me for not having done enough: He might rather have done me that justice as to acknowledge, that I had done more then enough to maintain my Reflexions, and that I was obliged from that time to seek the poison elsewhere then in the yellow liquor, in regard it did no longer intervene, according to him, in the three last bitings, and that the three last Pigeons were as soon, yea sooner, dead then the two first, of the death of which he could charge the yellow liquor. If I could not find, no more then Sign. *Redi*, in all the body of the Viper, any other visible or palpable part that was venemous, and that might justly be declared to be the seat of the poison, and the true cause of the death which ensued upon the three last bitings; he must not wonder, if I have sought and found it in the *vexed Spirit*, and if I have grounded my self upon the best evidence, I could get from Experiments and Reason.

But since the chief motive of my tryals hath been the desire of exactly knowing the Truth concerning those matters, having seen that

Sign.

Sign. Read, Pag. 31. of his last Letter hath desired I would make new experiments after his Objections against me? To be the more assured of all, I have been willing to give him that satisfaction, in giving it to my self. For, in the moneth of May last, in the Chymical Laboratory of the Royal Garden, in the presence of two or three hundred by-standers, both Physitians and others capable to judge of it, and worthy to be credited; from amongst many live Vipers, sent me out of *Dauphine*, and divers parts of *Poitou*, I chose a great Femal-Viper, that was lusty enough notwithstanding the great way she came, and having open'd her jawes, I very carefully cleared and squeezed out of them at several repetitions, all the yellow liquor contained in the bags of her gums, and that also which might be diffused about the neighbouring parts, with a fine piece of linnen cloth wound about the handle of a pen knife. Which done, I took the same Viper with Pincers about her neck, and angred her in making her to fasten her teeth into the end of her tail, and in pressing from time to time her neck with those Pincers; and immediately after I presented to her five Pigeons and two Pullets one after another, to bite them in the most fleshy part of their Chest, having irritated her every time

of

of her biting. I purposely wounded also six Pigeons and Pullets in divers places, in the presence of all the company, and let into the wounds some drops of the yellow liquor, drawn from the Vesicles of newly enraged Vipers. I laid both sorts a part; and the company parted about an hour after, before which time, five of the Pigeons and Pullets, that had been bitten, were dead, and the two remaining died about an hour after; but the Pigeons and Pullets, which I had wounded, and in whose wounds I had put in some of the said juyce, ailed nothing, but that there appeared some lividness, at the place wounded, and such an one as might have been there from the sole wounding them, and without any concurrence of that liquor. Two days after, I shew'd the company the same wounded Pullets and the same Pigeons, which were very well, and had their wounds almost perfectly healed up, only there remain'd a little blewness about the wounded parts. I would then have wounded the same animals again in other places, and introjected fresh yellow liquor: some also of the by-standers proposed to let into one of these creatures some of this yellow liquor by that way of Transfusion, that hath lately been made in divers parts of *Europe*, of some stranger blood

into

into the veins of men, that ſo this juyce being mingled with the blood by the ordinary circulation, it might be able to diſcover what ever it could do. I readily complied with their motion, whereupon the intromiſſion of this liquor was attempted upon one of the ſame Pigeons that had been wounded two days before. One Phyſitian and two Chirurgions did the work one after onother, in making both the inciſion and the ligature of the moſt diſcernable veſſels of the right wing: But they let the Pigeon looſe ſo much blood, that it dyed ſoon after. Seeing this, I ſaid, that the Pigeon dyed only from the loſs of its blood, and not from the letting in of the yellow liquor; and that it would be neceſſary, one only Chirurgion of the Company ſhou'd make a new operation upon another of the ſame Animals, that had been wounded 2 d. s before, and upon whom that yellow Juyce had alſo been tryed. The Operation was made accordingly at the ſame time upon a Pullet, which did not only eſcape again, but was ſeen the next day and the following days by the whole company to be very well; as were alſo the other anima's that had been wounded again at the ſame time, and received of the yellow liquor, though without the way of transfuſion. Yet true it is, that one of the

Pigeons, that had been the second time wounded, was found dead some time after its being wounded, in a close earthen Furnace, very hot, and standing close by such another, where I then distilled some spirit and oyl of Tobacco, and the death of which ought to be imputed to the piercing vapors of this distillation, or to the excessive heat of the Furnace in which it had been shut up, which was found so hot, that the heat of it could not be endured by one's hand; besides that being closed, almost no air could enter.

Which being thus passed, yet forasmuch as the reputation of Sign. *Redi* had acquired him much esteem and favour from many persons in *Paris*, I perceived some of the company yet inclined to doubt, whether this yellow Juyce were always innocent. Whereupon, having by me 4 Dogs of different bigness, I press'd those that seemed most to doubt, that they would transfuse or cause to be transfused some of that reputed poisonous liquor into all those Dogs, or at least into one or other of them; but how instant soever I was, no body would undertake it. It was alledged, that those Animals were too Robust to succumb under such an operation, since the Pullet, that had endur'd it, and twice felt the yellow liquor, had escaped as well as the

other

other Animals, that had been wounded again at the same time with it, and that had also received into them some of that liquor. Which obliged me to protest, it was not my fault that it was not experimented a fresh, and to pray the company to take the refusal of those persons for an acknowledgment of the innocence of the yellow liquor.

But not being satisfied herewith, I referred the matter to the next day, and promised to have ready new Animals, of a lesser size than those Dogs; the more amply to verifie the innoxiousness of that Juyce by new intromissions thereof into wounds.

I had then prepar'd six Pigeons, and two Catlings; and engaged a person whom I knew most favourable to Signor *Redi*, to make himself the incision, and intromit the yellow liquor as he should think best. He made such wounds as he pleased, and he did even sever the skin of the flesh round about the wounds he had made, and so far, that I could not hold to tell him smiling, he did more than Signor *Redi* himself said in his Letters he had done; and added, *Boni esse pastoris tondere, non de glubere*, A good Shepherd did Sheer, not Flea his Sheep.

One of the Catlings was bitten in the Cartilagineous part of the Ear, without any ap-

pearance of blood at the place of the biting; and it escaped. The other, which was much less, and a very noted one by the blackness of its colour and by having her ears cut off, was purposely wounded on the upper part of her neck behind, and also at the lower bone of the hinder part of the head; its skin also was separated from the flesh round about the wound, and on both sides, almost as far as to the fore part of the neck: And then as much of the yellow liquor as they would was put into both sides as well as into the wound. This Cat held down her head, by reason doubtless of the pain she endured by having in a manner been flead alive; feeling also some pain in two other places, where she had been wounded and flead. Some of the by-standers began already to mutter, and said, I should be cast, and the Cat would certainly dye; yet notwithstanding the Cat did not dye, though she was very little and taken out from under her dam; and she was shew'd to the company 24 hours after, sound and safe, although she had neither suck'd nor eaten any thing all that time. And 'tis remarkable enough, that this very Cat, having been returned to a Fryar to whom she belonged, and being grown big, hath yet to this day the hind-part of her skull uncloſed at the place of her wound; and

and notwithſtanding all that, & the falling off of ſome fleſh and skin, that were ſever'd from the places where ſhe was ſtead, ſhe is very lively and full of play, and very divertiſing mimick geſtures.

The ſix latter Pigeons, that had been wounded at the ſame time, and received of the yellow liquor, were likewiſe produced; and they were yet kept five or ſix days with the other Pigeons and Pullets that had been twice wounded before; among which was that alſo on which the tranſfuſion had been imitated. At laſt they were killed, roſted, and eaten, in good company, of which were ſome of thoſe that ſaw them wounded; and that found them very good and ſavoury meat.

Amidſt all thoſe Experiments I omitted not to try, whether the heads of Vipers newly dead, having yet their necks on, with all their yellow liquor, would be able to kill Animals, by making them to be bitten by them. I tryed it upon Pigeons and Pullets, by thruſting the teeth into them as deep as I could. I employed alſo to the ſame purpoſe ſome whole Vipers, which I had found dead among the live ones in the barrils, and which abounded in the yellow liquor. But this was always without any inconvenience to the Animals bitten, ſo far was it from killing them.

I here pass by many other Experiments made at my house, in the presence of several Physitians, that did all agree in making out the innocence of the yellow liquor, and in ascribing the poisonousness to the enraged spirits.

Yet I must not leave here un-mentioned, what was done by three young Physitians, who being perswaded of the truth of my Experiments, as well concerning the innocence of the yellow liquor, as that of bitings made without the angred spirits, caused their fingers to be bitten, to strifes, by a dead Viper having yet all her yellow liquor, and that so deep that the blood of it appeared to all. But they found no other inconvenience by it, but what they might have felt from prickings made by a needle.

I had certainly made a far greater number of Experiments if I had not observed, that Sign. *Redi* himself had already made many for me, and for the maintaining of my sentiments; and among others that of *pag.* 26. of his first Letter of Observations, where he saith,

Si mori un pollastro morficato, &c. That is, *There dyed a Pullet bitten by a Viper, the points of whose teeth I had cut off; and out of whose vesicles I had squeezed out all that ill juyce that is there.*

For

For, since by his own confession, there dyed a Pullet by having been bitten by a Viper, the points of whose teeth he had designedly cut off, and all whose yellow liquor (which he calls the ill juyce, and will have to be the only seat of the poison) he had carefully press'd out of the vesicles of her Gums; He hath no more ground then I, to charge the death of the Pullet upon a liquor, which was there no more, nor upon the points of the teeth, which he had cut off. And he cannot avoid to accuse with me the vexed spirits of the Viper, and to fall into my opinion, *viz.* That the venom of the Viper is not a gross matter, but something invisible and spiritual.

And to shew again, that Signor *Redi* hath laboured, without being aware of it, to justifie my Sentiment, and that at the same time he manifestly contradicts himself, by destroying in his last Letter his first Propositions, which is, *That all the venom of the Viper issues at the first, or at least at the second biting, and that the third is venomous no more*, as he assureth to have often experimented; to shew that, I say, I shall alledge the words of pag. 33, 34, and 35. of his last Letter, *viz.*

Su'l principio di maggio scelsi una vipera &c. That is, *About the beginning of* May *I chose a Female-Viper, one of the biggest and lustiest, and*

vexed her to bite ten Chickens, one after another, in the right thigh; of which the first, second and third died almost in an instant; the fourth seem'd only to be sick, but the fifth and all the rest did not only not dye, but were not at all sick; and yet every time the Viper did bite, I angred and madded her exceedingly. In the moneth of June *I repeated the Experiment in five tame Ducks, bitten by one and the same Viper, which also immediately after bit three young Turtle-Doves. The first wounded dyed three hours after; the second five hours after; the rest escaped. 'Tis true, that the first mention'd of the Turtles dyed, but not the other two. Of twelve Ring-Doves at one time there dyed but four; but the next day of twelve others there dyed six. Of five Rabbets there dyed three, and of three Lambs the two last dyed; the first of them dying two hours after it had been bitten.*

These several Experiments directly contrary to the first assertion of Signor *Redi*, were capable to perplex any other head but his. For first, he hath seen, that of ten Pullets bitten one after another by one only Viper, the three first dyed suddenly, and the fourth was somewhat sick; He hath seen, that of five Ducks and of three Pigeons, bitten one after another by a single Viper, the two first Ducks dyed, as also one of the Pigeons, which

had been bitten even after the five Ducks: He alſo ſaw once, that of twelve Pigeons bitten, four dyed; that another time of twelve there eſcaped but the moiety; and that of five Rabbets, likewiſe bitten, there were but two that evaded dying.

I cannot but be amazed, that all theſe Experiments have not been able to change his opinion, or at leaſt to ſuſpend it. Nor do I doubt but that the number of Animals that died would have been much greater, if the bitings had been made in other places but the legs. For, beſides that they have their bones, nerves, and tendons, that are able to blunt the point of the teeth at the firſt biting; they have alſo their Muſcles, which are very viſcous, and therefore fail not to imbue the teeth of the biting Viper, thereby ſtopping in part their Pores, and even hindring them by that viſcoſity from entring far in the enſuing bites, and I likewiſe doubt not, but that will come to paſs more and more in the reiteration of their bitings. Nor do I wonder, that the Ducks did not dye ſo ſoon as the Pullets or Pigeons, nor that there dyed leſs of them; for, beſides the reaſons juſt now alledged, they have their skin, bones, and all parts much harder, and far more difficult to be pierced by the Vipers teeth, than thoſe of Pigeons or Pullets.

Pullets. Now I do not find any part more proper to try divers bitings, then the fleshy part of the chest, which hath neither Nerves, nor Tendons, nor bones near, nor that Viscosity found in the Muscles of the legs.

Mean time these Experiments made by Sign. *Redi* himself, must oblige him, as far as I can judge, to relinquish his first Assertion: And if he will persist to maintain, that the yellow liquor is the true seat of the poison, he must needs believe that liquor to be inexhaustible, and that always there succeeds some fresh, in all the bitings of a Viper; or, if he will abandon his opinion, and ascribe the poison no more to the yellow liquor, he must find out some other subject to assign it to, except he please to take mine, and to lodge it in the irritated spirits; in regard that he cannot find it in the yellow liquor, which is no more there, after the second biting (as himself assureth;) and which must yet more evidently be wanting there, when designedly he had with care taken it out of the bags of the gums of the Viper that bit the Pullet, and the bite of which was followed by the death of the Animal bitten.

But if Sign. *Redi* should now be in an humor to alter his opinion, and to judge the yellow liquor to be necessary in all the bitings of a

Viper

Viper (though that be an impossible thing;) his opinion would never be received by disinteressed persons, that have seen my first and last Experiments; among which persons there are some, even of the most able, who, having before examin'd the *Salival Glandule* upon the description I gave them of it after I had discover'd them, did there observe also some small *Lymphatic* Vessels, more numerous then those that had first appeared to me; and who, having seen the last Letter of Sign. *Redi*, were willing to suspend their Judgment until the making of my new Tryals, which have altogether confirm'd them in my first opinion.

For, not to speak of this, that in the presence of divers persons, even of the best quality, at several times and places, in diverse assemblies, & even in the Conferences of the Abbot *Bourdelot*, I have swallow'd some of the yellow liquor taken out of the bags of the gums of many live and enraged Vipers, without finding the least inconvenience from it, no more then the Viper-eater of Sign. *Redi*: I can boldly assure all the world, that in no time, in no place, there ever dyed any animal of all those I have wounded, or seen wounded on purpose, and into the wounds of which that liquor hath been introduced, although it had been drawn not out of the Vesicles of the

the gums of Vipers exceedingly vexed; so far is it, that the Juyce of dead Vipers was able to annoy any animal. I can also assure, that never any head of a dead Viper, whether the Animal were whole, or that head only with its neck, and though it abounded with that yellow liquor, hath done any harm to man or any other Animal, bitten by it.

The yellow liquor, which I swallow'd in one of the conferences of the Abbot *Bourdelot*, puts me in mind of a Letter, which M. *Des Tapieres*, a very curious, sincere and able Apothecary of *Bourbon l'Archambaud*, had written to him, which was there read, and among other things did relate, That in the year 1630. he had taken a Viper, whose crook'd teeth he had cut, and that he carried her in his bosom; and that after two or three days, a fancy taking him to approach her to his face, pressing her a little, she bit him in his lip, and thereby caused great pain to him; whereupon he flung her to the ground and in his anger crusht her in pieces; that his lip and face swelled; that a Ligature was made upon him; that Treacle was given him, and some of it applied to the bite; that at the place of the wound there appear'd a little bladder, whence issued two or three drops of liquor of a dark yellow colour, and that

his

his face remain'd very pale for a moneth.

If my opinion be asked about this Experiment, I declare that there is nothing in it, which I ought not to believe; and I add also, that there hapn'd nothing in it, which agrees not with the principles by me establish'd and maintain'd. For, although the great teeth of that Viper had been cut, which might have gone further, and mingled the enraged spirits of the Viper with the blood of M. *Tapiret*; yet they had not cut the point of the small teeth, which I shew'd in the same conference, together with the other neighbouring parts in the teath of a live Viper, sent to Monsieur *Bourdelot* by the same Apothecary that had been bitten: of which small teeth I have heretofore given the description and figure, as well as that of the upper and lower Jawes, in which they are fastn'd, as may be seen in my *Anatomy of Vipers*, in the *Section* of the teeth, and the third *Cut* of that Book. For, although those little teeth have not the length nor thickness of the great ones; yet they have the same shape and the same matter; for they are bony, crooked, transparent, and very sharp; so that the vexed spirits may pass into them as into small Funnels, and through their Pores, as they do through those of the bigger ones. But they cannot go very deep,

because

because their smalness permits them not to carry their openings as far as into the flesh; and all they can doe, is, to open the skin. Now to reason upon the accidents that befell M. Du Trajeter by this bite, as they are set down in his Letter; I see nothing in them that is not very natural, and very credible. For, although the angred Spirits had entred by the openings made by the small teeth; yet they could not penetrate the flesh, nor mingle with the blood, because those apertures were not deep enough, and they could do no more but to make their effect 'twixt the flesh and skin; whence followed the swelling of the lip and face, and the impression of the pale colour, which appear'd there during a month: which accidents might at first have been easily prevented by one only dose of the volatil Salt of Vipers, which would have made the engaged Spirits to transpire, that lodged between the flesh and the skin, and could find no entry to pass further. As to the little bladder, which was formed at the place of the bite, and the two or three drops of dark liquor that issued afterwards, that was nothing but a little serous moisture that had been gather'd there from the neighbouring parts, and that had been caused by the compression of the Ligature,

and

and by the bruising made by the teeth and Jawes at the time of the biting, and without any intervention of the yellow liquor, which besides its innocence, could not have entred through such small apertures.

After so many Experiments, and upon so many Reflexions which I have made, as well on the yellow liquor, as on the irritated spirits of Vipers, I cannot comprehend, how the Animals of Sign. *Redi* could dye all and without any exception by the intromission of the yellow liquor into the wounds, he had made in them, and by the biting of heads sever'd, or by that of entire Vipers that had been dead several days. I have too many experiments to the contrary, and too many witnesses, to put it out of doubt, and to fix me in my first opinion.

But, to the end that among the Truths by me advanced, and consisting in matter of fact, the publick may find wherewith to be satisfied; I thought my self obliged to explain my sense upon these matters, and to form to my self the Objections, that may be made against me.

I say therefore concerning the *Yellow Liquor*, That nothing can act from it self, but according to its nature, the disposition of the matter of which it is composed, and the force

of

of its activity. For example, you will not find in River Water, the taste, strength, nor particles that are found in Wine, nor will *that* inebriate like *this*: it hath not the acrimony nor penetrancy of Urine, neither the colour not bitterness of Gall: The Spirit of Wine, that is freed from the aqueous parts, which hindred the Wine from producing the effects it was capable of, is much more subtile and strong, then the same wine whence it hath been drawn: The Volatil Salt of Wine hath quite another penetrating force than the Urine which contained it before its sublimation: And not to go from my subject; the volatil Salt of Vipers is very different from the flesh and bones of them, whence it hath been extracted; and, though in small quantity, it will work more in a moment as well by its odour as its piercing vertue, than ten times as much of that matter, whence it hath been drawn, could effect in many hours: The bileous, sharp, salt and spirituous serosity, that is often form'd in our bodies, will suddenly produce inflammations in the eyes, tumors in the cheeks, gums, throat, and many other parts, as also Pustuls, St. Anthony fire, and the Gangrene it self; and all that it does by the composition of its parts, and the force of its activity; whereas the thick and viscous

Phlegme

Phlegme will do no such thing, but chargeth nature only by its weight, cold, and tenacity: This Phlegme, I say, will ever be incapable of working with quickness, and it cannot produce any effect but very slowly, and in proportion to its power, which is extreamly confined.

So then, it is not the nature of the yellow liquor, to pass swiftly to remote parts, and there to act with vigor and violence; which is observed in the poison of a Viper. I say, that a tough, viscous, and in a manner insipid *Saliva*, cannot make any great progress in a moment. I affirm besides, that 'tis impossible, it should corporally enter into the holes made by the teeth, which are very small and almost invisible, and that it should also pass through the cavities of the teeth, and much less through their Pores, if any would have them pass that way. I say further, *that* although the teeth of a Viper should be all over imbued with that Juyce at the time of her biting; the skin of the Animal bitten, and the flesh it self, if need were, would keep it out of the bitten place, and hinder it from entring there; *That* though it should be able to enter, it must have a fit place to receive it, a great passage to go through, and a long time to arrive to the parts

remote; I say also, that though it were arrived there, (if that were possible,) it could never act beyond the forces, which nature hath restrained it to.

Besides, if this yellow liquor were capable of any considerable operation, it would not fail to discover it either in whole or in part, when 'tis swallow'd and got into the stomach; where the place, the heat, and all things would seem to concur *either* to make it ferment, if its matter were disposed for it, *or* to reduce its power into action: For, by passing out of the stomach into the intestins it would infect the Chyle, and make of it a poison, which would be carried jointly with it through the milky vessels, and through the Thoracique Ductus's, so happily discover'd by the illustrious M. *Pecquet*, to descend into the Heart with the blood, the which is the matter, on which the poison of Vipers does so particularly exert its dominion. And this way is much more easie and large, than that of the opening, made by the teeth, by which this juyce cannot so much as enter. I say this further, that, if it were such as Sign. *Redi* makes it to be, it would, being taken at the mouth and let down into the stomach, impress upon the places of its passage, and those of its stay, some mark or other of its power, especially

ally if it did contain any *Arsenical* Salts, which would not fail, soon to manifest themselves either by their taste or by some other effects: And yet all those that shall taste or swallow this yellow liquor, shall never perceive any malignity whether great or small, neither in the mouth, nor in the stomach, nor elsewhere. I conclude therefore from all these considerations, that this juyce contains in it no part at all, that is able to dissolve, or coagulate, or discompose any part of our body; & that it hath not any quality, manifest or occult, to shew that 'tis capable of doing so.

I add moreover, that this juyce, as flat and salivous as it is, is always found so yellow in all parts of *France*, that it can hardly be less colour'd than 'tis in *Italy*; and that they both must have altogether alike qualities, or, at least, very near such. And it would be to no purpose, to alledge in favour of Sign. *Redi*, that the diversity of places and climats, or that of aliments might be able to change the nature of Vipers, and cause that manifest difference, there is between his Experiments and mine. For, although some diversity may be observed in other things, there can be found none in this; and if there could be some difference, it cannot be that the nature of the yellow juyce, and that of the Spirits should

be *quite* changed; since we find in *France* the same marks in that liquor, which Sign. *Redi* hath found and described in that of *Italy*, and since our Vipers, without any intervention of that juyce, do kill as nimbly as his can do.

But I think it would be much, if in the yellow liquor, or in the enraged spirits, there could be observ'd any *small* degree of quality, stronger or weaker in *Italy* than in *France*. For, I have by a great number of experiments made it out, that all the Vipers of *France*, though taken in very different places, and often such as are six score Leagues distant from one another, have their poison altogether alike, and do kill equally. Whence I infer, that the difference of the Vipers of *Italy* and *France*, cannot be considerable; since *Dauphiné*, which is a Province in *France* that furnisheth us with many of them, and is very mountainous as well as *Italy*, borders upon *Piemont*, which is the beginning of *Italy*; and that the same *Dauphiné* abounds in Vipers in its utmost extremity; and since also all Vipers, we get from thence, have their yellow liquor always very innocent, though high colour'd. And I can truly say, that those Vipers, that have serv'd me most both in my first and last experiments, were most of them sent me out of *Dauphiné*, and that I was willing

ling to make use of such, as being commonly bigger than most of those that were sent me out of *Poictou*; that, at least, which serv'd me to bite the five first Pigeons, which I spake of in my first Experiments; and that which bit the seaven last Pullets and Pigeons, were of those of *Dauphiné*, and even of the bigger sort that could be procured.

And it would have been to no purpose to have used any tooth of a Viper sever'd from the head, and much less to wipe it dry with some bread crums, in hopes it should kill any Animal by pricking it therewith; seeing the teeth, that had of the yellow liquor upon them, without being separated from the dead heads, were not able to do any harm, no not those of live ones, without the concurrence of the enraged spirits. And if sometimes I have made use of bread-crums, sometimes of a fine linnen ragg, to wipe away all the yellow liquor of the vesicles, that was never but in live Vipers; to shew, that it was not that liquor which did kill, but the vexed Spirits only, entring by means of the biting.

We are not to imagine neither, that a Viper teareth by biting, unless having made her to thrust her teeth into the flesh of some animal, you do immediately after draw her away by the rest of her body: We are not, I

say, to pretend, that a Viper doth, by biting of her own accord, make any great opening, at which the yellow liquor is able to enter. For, she doth no more but thrust in her teeth far enough, and presently draw them out again, with as much ease as a Cat draws out his claws when he will. Besides, you cannot perceive but two very little holes, which do also seem as 'twere closed again by the flesh, and which would hardly be discern'd, if the pain of the bite, or the accidents ensuing, did not oblige us to look very narrowly to it.

We also never see, that the poison fastens it self to the part bitten, nor that the evil begins by a mortification, or by a gangrene there. For, if that were so, and if the venom did lodge at the entry, it would be much more easie to master it. I know also by many Experiments, that the poison never stays at the place where it enters, but insinuates it self very nimbly into the Veines, to mingle with the blood; especially if the bite hath open'd for it a passage free enough to arrive there. I know, that there it produces afterwards those troublesome accidents, which ensue upon the biting; and that lastly it causeth death, if it be not prevented by a quick relief. Which clearly shews, that a poison of this nature must needs have dispositions to pene-

penetrate, very differing from those that appear in a yellow liquor, that is incapable of all sudden motion and operation.

It would also prove an useless labour, to suck at the place of the biting, in hopes of getting out from thence a Juyce, which could not enter there. And though I do not disprove this way of succours on such occasion; yet I know, that all what the sucking can do, is, to fetch out again part of the enraged spirits, that had enter'd by the openings of the bite. I know also, that a specifique remedy, taken at the mouth, is far better.

I would be in vain, to object unto me the example of the seed of Animals, which, notwithstanding its viscosity, serves daily to propagate that *Species* which produces it; and that it could in like manner come to pass in the yellow liquor to convey the venom in the biting. For besides that the seed is the purest and most elaborat part which an animal can produce; it is also accompanied with store of Spirits; and there needs, besides, the concurrence of many other means as well to introduce and to receive it, as to form and perfect the *Fœtus*: There is moreover necessary an assistance of abundance of spirits from the mothers side; a juyce proportionate and proper for its nourishment and

increaſe, and a ſufficient time for the ſame. Whereas the yellow liquor, *that* can paſs for nothing but a juyce excreted out of the Salival Glanduls, after it had been ſent thither from the brain and the neighbouring parts, and *that* is deſtitute of ſpirits and of all diſpoſition to act; wants alſo a paſſage ſufficient to introuit it, and a place proper to lodge in. And if you ſhould grant it an entry, and a place to ſojourn in; it muſt have a much longer time than the ſeed, of which I was ſpeaking. But with all this time and all the other circumſtances, it would ſtill be incapable of working any thing at all perfect, and periſh of it ſelf, without any remarkable production.

If any ſhould ſay, That this yellow liquor may have ſpirits proper and proportionate to its nature, and that they are not wanting to make the poiſon work at the moment of the biting; but that, being drawn out of the veſſels, and expoſed to the Air, thoſe ſpirits are diſſipated, and thereby render it incapable of all action: I anſwer, That, without ſtaying upon what I have amply made out of its innocence in all kind of uſes, Signor *Redi* himſelf contradicts it, as I have mentioned above; ſince he pretends, that the juyce even of ſuch Vipers as have been dead for ſeveral days, &

that

that is dryed to boot, ceaseth not to insinuate its venom without any intervention of spirits, when it is put into wounds. But, besides all that, many Experiments have evinced to me, that death follows the biting without any intervention of the yellow liquor, and then when it hath been perfectly wiped away. Moreover, It is well known, that 'tis the nature of spirits, to be in motion, to fasten themselves to, and to follow the parts that have most of them, as for example, the blood. It is also to be noted, that the spirits, that do insinuate the poison, are not of the nature of those that follow the ordinary motion of the blood of the animal; *that* they do not joyn themselves to it, as those; and *that* neither of them have any union with the yellow liquor; which is but a meer excrement; But that the *Spirits*, I speak of, do form themselves in the moment that the Viper conceives the *Idea* of revenging her self; and they need not the embarasment of such a dull and viscous juyce, which is not qualified to follow them, nor to pass through the imperceptible pores of the teeth, which the spirits only can penetrate, no more then they can any ways enter through the holes, which the teeth have made. In a word; the nature of a gross, tough and viscous juyce is not, to act, penetrate, and be swift-

wiftly carried to the moſt remote parts of the body; but that belongs to ſpirituous ſubſtances, to go and come where groſs corporall ones cannot. Theſe are the only ſpirits, that can ſubvert the whole Oeconomy of the body; they are they, that diſturb the circulation of the blood, and that corrupt it; they are they, that ſtop the natural and animal ſpirits, and hinder them from paſſing to the parts of the body as they were wont to do; and laſtly, 'tis by the let of them, that the death of the Animal uſually enſueth the biting.

As to what may be objected, that 'tis very difficult, ſo exactly to evacuate the yellow liquor, that there remain none at all; and that it may very well come to paſs, that a little of it intervenes in all bitings: I anſwer, that beſides that this is alſo againſt the opinion of Sign. *Redi*, and which he hath renounced in his firſt Aſſertion; the Salival Glanduls, though many in number, yet are too ſmall and have too little capacity to contain juyce enough to furniſh for that purpoſe; and that that cannot be expected but from great animals, that have thoſe Salival glanduls and the other parts far bigger: And though it were poſſible, they ſhould ſufficiently furniſh, I do maintain, that the impoſſibility of intromitting that juyce, and its evinced innocence,

ought

ought to suffice for confuting this Objection.

Yet this I shall here say in favour of Sign. *Redi*, That I doubt not but that this yellow liquor, as Salivous and Excrementitious as it is, contains its Volatil Salt, as well as all the other parts of a Viper, and all the parts of Animals, and even all their excrements, and that consequently it is to be reputed spirituous. But then, besides that these spirituous substances are never hurtful, they are yet too intimately mixed and locked in with their matter, and they cannot produce their effects without being separated from it; which cannot be but by a violent heat, and in vessels fit for it. I say therefore, that by art there may be extracted a true Volatil Salt out of this yellow liquor, & even without any addition or mixture of other matter; which may be proved, to be of the same nature with that of the other parts of a Viper; and that 'tis so far from being able to work like poison, that 't is very proper and effectual to master all the ill accidents, which the bite of a Viper may cause; of which I do accuse the enraged spirits alone. Since therefore Sign. *Redi* hath dried and laid aside the yellow liquor of two hundred and fifty Vipers, and may easily obtain much more of it; 'tis in his power to extract such a salt out of it, when he pleaseth, to verifie

what

what I was just now saying: And if, to save himself that labour, by reason of his other important occupations, he shall please to send me a competent quantity thereof, I do with all my heart offer my self to prepare it for him, thereby to let him see not only the innocence of this juyce, but also the great benefit, that is hid in it.

Concerning the *Bilious Breath* of a Viper, that may be charged to intervene with this yellow liquor, and to envenom it; I am of opinion, that that is nothing but a disguise of the enraged spirits. I assert, *That* the true Breath of a Viper is ever innocent, how bilious soever it be represented; *that* there issues not any ill scent out of her throat, nor out of her guts, nor from the parts made to void the excrements; *That* Vipers among other marks are in this different from Snakes, that *these* have their excrements and the parts containing them very fetide and of a smell of stinking Urine; whereas you cannot perceive any ill smell in any part of a Viper; *that* the Spirits which carry the venom are quite another thing than the breath coming from the Lungs; *that* those spirits have no union nor correspondence with the Bilious humour; *that* they are not formed but at the instant of the irritation; and lastly, *that* they need no

such

such thing as an excrementitious and useless liquor, pretended to intervene, fit for nothing but to gard the passage of the place, through which the vexed spirits have entred.

But the better to shew the impossibility of the intervention of this breath, and to make it appear, that it never contributes any thing to the poison; you may take notice, that a Vipers head cut off, separate from the Lungs and all communication with the Gall, and incapable to yield any breath, and deprived even of all that yellow liquor; yet failes not to kill by its biting as long as 'tis alive, if the animal have been provoked; just as would come to pass, if a bite were made by the head of a Viper that is whole and alive, if no remedy were applied.

Touching the Communication, that may also be pretended to be between the bladder of Gall and the yellow liquor, by reason of some resemblance of colour; I say, that, besides *that* my sentiments in these matters are very conform to those of Sign. *Redi*; *that* we have both of us justified the innocence of the juyce contained in the Bladder of Gall; *that* we have denied, there is any vessel carrying this better juyce into the vesicles of the gums, to make that yellow liquor which is found

there;

there: and lastly, *that* we have unanimously contradicted the errors of the Antients about this pretended channel; besides this, I say, the truth of what we have affirmed is very easie to prove, by tasting the yellow liquor of the Gall, which is very bitter and very sharp, though very innocent, and by comparing it with that of the vesicles of the Gums, which is very flat, though equally innocent. The same may be yet better made out by dissecting one or more Vipers; where, no more than in Serpents and all other animals, you will never find any vessel, that carries this bile of the Bladder of Gall to the Gums; and you will there see nothing but veins and arteries filled With true blood. Of this there will be no doubt, if you please only to taste it; for you will find nothing but the ordinary taste of blood. To be yet more assur'd of it, you may taste all that runs out of the body of a Viper, when the head is sever'd from her; for you shall find no bitterness at all, nor other tast but that of blood. And besides, having amply verified, that the yellow liquor comes from the Salival glanduls alone, and having given a very exact description of them; I think it needless to say any more of it, what ever the Antients may have written, or the Moderns may say of that subject.

To

To come now to the *enraged Spirits* of a Viper, which I do assure to be the true and only seat of the poison; methinks Sign. *Redi* hath no reason to oppose my opinion, when I do interess in it the imagination of the Viper, or her *Idea* of revenge, for the formation of those Spirits. I might here alledge what *Van Helmont* saith in his Chapt. *De Tumulo Pestis*, viz. That not only the *Idea* and the Imagination of terror are formed in the inward *Archeus* of the person invaded by the Plague; but that the Toad, which hath, *as he saith*, a perpetual hatred against man, finding himself taken, and hanged by one of his hind-legs, and in a condition of dying, conceives an *Idea* and an imagination of terror by the sight of the man, that often presents himself before his eyes, and whom he looks upon as his capital enemy, and that the same *Idea* or the same phancy of terror, which the Toad hath conceived by this means, forms in him such impressions and qualities, as are permanent even after his death. Then this Author will, that of this body, that dyed in those *Ideas* of terror, mingled with the parts that have issued thence, and with the wax that shall have received them, you shall make Trochesque's, which being taken inwardly, and carried about you, or applied, shall have the

virtue

virtue of curing as well as preserving from the Plague, by mortifying by their Specifique quality the terror which the inward *Archeus* of the person may have conceived of this evil. Now since this sentiment of *Van Helmont* hath found place in the minds of many men, very capable to judge of it; who have been thence induced even to make exactly that preparation of Toads, which he hath taught in the same *Chapter*, and which I can assure I have my self made to satisfie the desire of very able Physicians; having also known many persons giving great credit to it, and carrying continually about them of those Trochesques whilst there was talk of the Plague; methinks, that the formation of the enraged spirits, which I ascribe to the *Idea* and imagination of revenge, conceived by the Viper when she is vexed, is incomparably more maintainable, and much easier to be comprehended, as well as the entry of the angred Spirits through the Openings made by the Teeth; because not only these Apertures are wont to be deep, but also because the teeth being hollow, serve for a Funnel to intromit those spirits, that accompany the biting, and that produce afterwards in the body bitten those dismal effects of vengeance, which the Viper had conceived when she felt

felt the ill done her; And the letting in of those Spirits through the cavity of those teeth is so much the more easie, because there is also at the end of each great tooth a hole, which, though very small and almost undiscernable by the eye, may yet be discerned by a Microscope, & hath accordingly been lately seen in some publick Assemblies at *Paris*, in the presence even of persons very affectionate to Sign. *Redi*.

What shall we say of the imagination of Fright and Constraint, that a Toad also impresses in a *Weesel*, which having seen and been seen by that ugly animal, at a certain season of the year, and always in summer, can not avoyd to run a pretty while round about it making a continual shrill noyse, as if she cried for help, whilst the Toad remains moveless with his throat open; and which after a long troublesome motion, is constrain'd to come and render her self into that throat. The thing is too well known in divers places of *France* to doubt of it; and I can assure to have heretofore seen it my self; and that after I had well observ'd and withal wondred at the force of those *Idea's*, appearing in the agitation of the Weesel, and in her being constrained to fall into the mouth of the Toad,

I had the satisfaction to kill the Toad in that moment, and so to save the Weesel, which quickly run away, finding her self deliver'd by the death of the animal, which was followed by the extinction of those *Ideas*, that before had had so much power over her. This effect cannot be adscribed to the foam, nor to any material part of the Toad, since the Weesel flyes from him naturally, and falls not into his mouth but in spight of her teeth. Besides that the foam of the Toad, which the Weesel failed not to meet with in his throat, can work nothing, seeing the Weesel saved her self immediately after the death of the animal. We therefore must needs seek for the cause of all these effects in the Spirits.

More-over, what will Sign. *Redi* say of a mad dog, which, in the pervertion of all his senses and of all the ordinary functions of his body, breaths after nothing but mischief, and makes it his business to reduce into the same miserable condition all men he sees, and even his own master, as well as all animals he can come near and bite? If then the mad Dog hath the power to make pass the same *Ideas* and the same imagination, which have seized on him, into all the creatures

tures that he can come to bite, and into man himself, though of a very different soul and nature from his, by doing no more than with the edge of his teeth to touch the superfice of the skin, and that through his cloaths that may retain and wipe off all the foam adhering to the teeth, and lyable to be accused of having a hand in the mischief; as is very well observ'd by *Van Helmont* in the same Chapter? If, I say, this dog hath the power of communicating his evil to all sorts of animals, from one to another, without a limit, and without excepting any kind; Why should he think it incredible, *that* a Viper is able by her biting to carry her enraged spirits into the bodies of such men and other animals as she can light upon; *That* these spirits are capable to kill the animal bitten; and *that* they effect this by the perturbation and corruption, they introduce into the whole mass of blood; forasmuch as they do manifestly hinder its circulation, and the communication of the natural spirits, that were wont to be conveyed into all the parts? Considering withal, that they do not extend themselves as far as those of the bite of a mad Dog; seeing none of the Animals bitten by a Viper, have any venom diffusible either by their biting,

or otherwise, as long as they live, and that they may be safely handled, and even without danger eaten after their death.

I say besides, that if it be true, that a man, who hath at all times the same spitle and the same teeth, & who hath them not pointed nor shaped like those of a Viper, is capable to introduce the Gangrene, and to cause death it self by a bite made by him in a rage; whereas another and longer bite, made by the same man not enraged, is not accompanied with any ill accident, and is healed like a simple wound; This being true, I say, we ought to think it neither strange nor impossible, that a Viper, which hath long and piercing teeth, and which shews the force of her being vexed by the nimbleness of her biting, should be able, by biting when enraged, to make animals feel the mortal effects of her vexed spirits.

What shall we say of the pricking of a *Tarantula* how slight soever? shall we declare it to be exempt from the *idea* and imagination of this little animal, since it impresses it so strongly and differently upon persons that have been pricked therewith, insomuch that it perverts in part the senses and spirits, conforms them to his stirring and skipping

nature,

nature, and constrains them at certain and set times to continual dancing for several days, and which having left a contumacious leaven of the same *idea's*, faileth not to produce the same effects every year, and, if you may believe Authors, as long as the *Tarantula* liveth, and until the same *idea's* be extinct by its death. And though I doubt not but that Sign. *Redi* hath seen very many examples of persons pricked by *Tarantula's*, there being store of them in *Italy*; yet I shall not forbear here to recite that of a *Neapolitan* Souldier, who hath been these four years among the *French* infantry. This Souldier, whom his Camarads call'd *Tarante*, because he had been pricked by a *Tarantula*, is still to this very day in the Royal Regiment of *Roussillon*. He never failed to feel every year at a determinate time (*viz.* about the 24*th* of *July*) the effects of that sting, which he had receiv'd before he came into *France*. He was always sure of the time about two or three days near it. And when the *ideas* of the sting were found exalted to a degree capable to produce their effects, he began to dance, and desired to hear without interruption the Violins, which the Officers of that Regiment caused to be play'd for him out of charity; to

which he answer'd continually, keeping time very well, without being tired, for three days, eating and drinking, without interruption of his dance; and being very impatient of any discontinuance of the play of the Violins, and that the more, if the intermission was any thing long; for then he became altogether livid, and fell into grievous swoundings. He pleased himself whilst he danced, to have in his hands several naked swords, one after another; to see about him many Looking-glasses, to behold himself in them dancing; to be environed with much people, and, that he might hinder them from going away, to take from them their Gloves, Ribbons, and such other things; being very careful to keep all he had taken from them unto the fourth day, which being come, his eagerness to dance abated, and at length quite ceased; he remembring all he had done, and knowing all that were about him, to every one of whom he rendred very exactly and without any mistake all he had taken from them, though he had to do with a thousand people. After which time, he past'd the remainder of that year, and the whole interval of his Paroxysmes without any inclination to dance. He was naturally melancholick,

in

in appearance of no great parts, neither had he learn'd to dance. He hath been seen thus dancing every year by thousands of people, and particularly in the Camp Royal *Anno* 1670. where the King himself and the whole Court saw him. And this hath been so beneficial to him, that the ordinary time is past this year without any assault of this evil, which he had great apprehensions of, finding himself at that time engaged in a march, and fearing he should want Violins at the time that the fit should take him.

Now since the pricking of this Animal, though very small, and in a manner like that of a small fly, being made even thorough stockings or cloaths, is able to act equally upon the body and the mind of the person stung; as leaving behind such long and strong impressions, and causing such irksome returns; To what can we adscribe all those different effects, if it be not to the *idea* or imagination of the animal stinging, or of the person stung. 'Tis needless, to alledge here the effects of the *idea* or imagination of Women with Child, nor of that of *Jacob's* Sheep. I think I have said enough to justifie the possibility of the *idea* or imagination of a Vipers revengefulness, for the forming

ming of angry ſpirits, ſufficient to impute unto them all the venom, and to exclude from it the yellow liquor.

After this, Sign. *Redi* muſt not wonder, if I, *who* make profeſſion of Chymiſtry, (of which I have the honour to read publick Lectures in the Garden Royal) *who* doe every day exerciſe my ſelf in ſeparating the ſpirituous parts from the groſs ones in mixt inanimat bodies; and *who* have not been able to find in any corporeal and ſenſible matter the true cauſe of the ſtrange and ſuddain productions, obſerved in the biting of a live Viper; If I, after all this, I ſay, have thought my ſelf obliged to ſeek for it in the *Spirits*; if having found it there, I have abandon'd his party, and communicated to the publick the diſcovery I have made.

Yet I am not over-much ſurpriſed, that Sign, *Redi*, being in this matter prepoſſeſs'd by corporeal groſs things, ſtill perſiſts in his ſentiment, ſince in the preparations, that do altogether depend of my profeſſion, and which I ought to know well, he rejects ſpirituous ſubſtances, which he reliſhes not, ſticking only to the more material, which are the leaſt, and in very ſmall quantity; which doth not keep him from believing them

them to be the best. You may see, what he writeth of it about the end of *pag.* 76. and at the beginning of *pag.* 77. of his first Letter of Observations, in these words.

In queste mie naturali Osservationi ho consumato gran quantità, &c. That is, *In these my natural Observations I have spent a great quantity of Vipers, making of them daily a very great slaughter; and, to extract the subtile from the subtil (as I may so speak) I always laid aside and kept all their flesh and bones, which being dryed in a Furnace, and afterwards by a quick fire with long and great labour burnt and reduced to ashes, I thence drew the Salt with Fountain-water, and purified it, and reduced it into a kind of Chrystal,* &c.

Those that know all the parts of which the body of a Viper is composed, will certainly wonder, that a person so judicious and knowing hath not found, that the chief and best part of a Viper consists in its volatil Salt, and that that Salt would not fail to avolate and to be wasted by that preparation or rather destruction, which Sign. *Redi* hath used to extract the Salt of Vipers. They will quickly see, that when he would draw the subtil from the subtil (as he speaks) he did

quite

quite the contrary, and expelled and dissipated the volatil and better parts, returning only the gross, the fixed and the least. They will soon judg, that he should not have given himself all that labour and pain, which he saith he hath taken, to succeed so ill in his work; and that he had done much better, with silence to pass over his process, then to publish it. The way, by him taken, will be found, I think, received from the Antients, who knew not, that all Animals abound in *Volatil*, and have little of *Fixed* Salt: And his preparation, which is very easie, would have pleased better in those times, especially in *Italy*, then that great and laborious Preparation of the Salt of Vipers, which was made with so great an *Apparatus*, and of which I have already given my thoughts, when I discoursed of the Remedies drawn from Vipers.

I also foresee, that Sign. *Redi* will not receive any greater advantage by striving to attribute to himself the first discovery of the *Salivial glandule*, which I found on both the Temples of both Male and Female Vipers, and which I have described and delineated in my Anatomy of Vipers: For, he will not be able to perswade it to those, who shall

see

see pag. 44. of his first Letter of Observations, the discourse following;

Se non stimassi vergogna scriver senza altra riprova, &c. That is, *If I did not think it a shame, to write, without other proof, what came into my phancy, I might say perhaps, that that yellow liquor is by no other way transmitted into the above said gums of the teeth but by those* Salival Conduits, *found out by the famous* Thomas Wharton, *and shewn in this Court by* Lorenzo Billini, *a learned young man and of great expectation, in other Animals besides Man, and particularly in Stags, and Wood-peckers: Moreover that under those Gums there are two small Glanduls, found by me in all Vipers. Yet I would not have you rely upon this thought of mine, because it may prove a Chimera, as I believe it to be one, &c.*

I cannot comprehend, how Sign. *Redi*, after he hath spoken of the *Salival Conduits* as of a thing that came into his phancy, and by a *perhaps*, that is to say, not knowing it; and who declareth, that he was ashamed to write of a thing without verifying it; who exhorts his friend to whom he writes, not to relye on his thoughts, and who adds, that it may prove a Chimera; I know not, I say, how,

how, after he hath written all this, he can pretend to be the inventor of the *Salival Glanduls*, and their Pipes: For *pag.* 55 and 56. of his first Letter speaking of the yellow liquor, he adds,

E queſto veleno altro non è, &c. That is, *This venom is nothing elſe but that liquor, which humects the Palat, and ſtagnates in thoſe gums that inveſt the teeth, not transmitted thither from the Bladder of Gall, but bred in the whole head, and conveyed* perhaps *to the gums by ſome Salival conduits, which* perhaps *are there inſerted.*

Where the word *perhaps*, yet twice again repeated, doth ſufficiently ſhew, that Sign. *Redi* did ſpeak of the *Salival conduits* no otherwiſe than as of a thing he was not at all aſſured of. And though he may ſay, *that* he hath had thoughts of it ſooner than I, (who have not medled with Vipers but ſome years after his firſt Letter,) *that* what he had written of it gave me from that time occaſion and a deſire to ſeek for thoſe Pipes and the Glanduls that might convey thither the yellow liquor; *that* the belief, he had of the Generation of this juyce in the whole head, induced me to ſearch for the Salival Glanduls higher and farther off than the place *under* the

bottom

bottom of the veſicles; and *that* I doubt not, that himſelf might have found theſe true Glanduls, if he would have taken pains for it. I anſwer, that, ſince he hath *not* done it, he ought not to be offended at my having labour'd for him, and ſucceeded in ſo doing: Neither hath he any right to deny, that I have firſt found, deſcribed, and to the life repreſented the two heaps of Salival Glanduls of a Viper with all their Veſſels, as well for forming, as conveying the yellow liquor into the Veſicles that cover the great teeth.

As to what Sign. *Redi* ſaith of me, ſpeaking of the Authors of my Book, that I have changed the words, *under the bottom*, into thoſe, *at the bottom* of the veſicles of the gums, and there ſought in vain for the two ſmall Glanduls, which he aſſures to have found there in all Vipers: I anſwer, that whilſt he is critical as to the letter of the words, *I* keep to the truth of the matter of fact: And I can aſſure, to have ſearched with much care, not only *in* the whole bottom of the veſicles, but every where *under* the bottom of them, but have not found any, whether great or ſmall Glanduls, nor any thing of the colour of a Glandul, nor that came any way near to their form.

I put it then for a truth, that there is not to be found any Glandul neither *in* nor *under* the bottom of the vesicles, and that *under* the bottom there is nothing but *the* gristly bone that gives the shape to the nose of a Viper; *the* two sharp ends of the two advanced bones of the skull, to which the two great teeth are firmly annexed; *the* conduit of the smell, *that* of the hearing; some small vein, some little Artery, some little Nerve, the extremity of a Muscle, and the two ends of the Salival Channels that discharge into the vesicles; as you may see it in a manner described in the Anatomy made of it by me.

After this, Signior *Redi* himself shews, that it was impossible, there should be Glandules *under* the bottom of the vesicles, since he saith, *pag.* 38. of his last Letter.

Ne io pavento mai scrivere, &c. that is, *Nor should I at all strive, that those Glandules lay in the bottom of the vesicles, if I was of opinion, that the yellow liquor did run into them after it had passed through the Salival conduits, which yet I imagined might have their Origin from a connexion with those two Glandules seen by me, and therefore must needs be in a situation a little distant from the vesicles, and not in the bottom of them.*

For since he saith, to have meant, that the yellow juyce took its course thorough the Salival conduits before its coming into the vesicles; He cannot find a way long enough, nor a distance great enough, for the need of long conduits, from the place *under* the bottom unto that which is in the bottom of the vesicles: For, there would have needed nothing but a little opening in the same bottom, to receive the juyce issuing out of the two little Glanduls he hath spoken of. And he shews sufficiently, that he cannot maintain those two small Glanduls *under* the bottom, where he would have them to be, since now he will needs have them a little distant from the vesicles, that he may find, in the intervall, a space sufficient for the vessels that are necessary to the course of this yellow liquor. Besides, that it is altogether impossible for two small Glanduls to furnish all that yellow liquor, which presents it self in the vesicles; since the two great heaps by me found in the two Temples and behind the Orbits of the eyes of a Viper, can hardly furnish each about a drop in the space of 24 hours, after the vesicles have been well voided. Moreover, it is very easie to judge by what *Sign. Redi* saith in his First Letter, that he understood not, the Salival Glands were seated, as

they

they are, on the two Temples, nor so near the skull; since he saith, that what came into his phancy, was, that the head of a Viper did not convey that yellow juyce but by certain salival conduits. For if he had been of another mind, he would not have spoken but of glands; or, at least, he would have begun with them before he had spoken of the conduits, which shews also sufficiently, that by this means he hath as 'twere inverted the order of nature: For, instead of placing the Glands close to the skul, and afterwards the salival conduits; he hath begun with these, and would have them immediately to receive the juyce of the Brain, and to carry them to the vesicles of the gums; and that his two pretended g'anduls are seated between the extremity of these conduits, and the bottom of the vesicles; though none be there, and it would be altogether useless, they should be there, because there are none but they that can at the beginning suck & digest the humidities of the brain and the neighbouring parts, and send them into the vesicles of the gums by the conduits appointed for this office.

But when Sign. *Redi* accuses me of having taken the bottom of the vesicles for that which is *under* the bottom of them, and of not having rightly understood, as he speaks,

hath

the *Tuscan* tongue; I may say, that himself hath not very well apprehended, nor duly explained the *French* terms, used by me; since he saith at the end of *pag.* 35. and at the beginning of *p.* 36. of the same last letter.

Sovra de chi gli, Autori delle novelle experience affermano, &c. That is, Whereupon the Authors of the New Experiments do affirm, that they could never see such Glanduls as I had named; but that instead of them they had found two others, which they call Salival, thus by them described, *p.* 31.

For neither in all that he hath afterwards taken the pains to transcribe out of my book on that subject, nor in all the rest of my *Section* upon the Salival Glanduls, he can have read, that I say to have found *two Glanduls*, but, *Glanduls*; there being a great difference in good French, between *Deux Glandes*, and *Des Glandes*, *two Glands*, and, *Glands*. And when, describing the Glanduls, I say, that they are seated on the two sides of the *Cranium*, I say afterwards, that there are many small ones joyned together, which may be call'd *Conglomerate Glanduls*. And yet more; I speak of an *Heap of Glanduls*; so far am I from speaking only of one or two Glanduls, as Sign. *Redi* hath represented me to have done.

And since, in hopes of better maintaining

his cause; he hath given himself the trouble of copying word for word, in his last Letter, only the most general place of my Book, and that which was the least contrary to it, in my *Section* of the Salival Glands. To shew therefore on my part, that the Glands, found by me, are very different, and that even they are quite another thing, than the two small ones spoken of by him; I thought my self obliged to transcribe hither out of my book what he thought not necessary for him. For in the same *Section*, p. 30. (in the English version, p. 33.) I speak thus of the salival Glands.

These Glands are found in all the heads of Vipers, both Males and Females; they are seated on both sides, and joining to the skull, in the hind-part of each round of the eyes, and at the same height with them. There are many small ones joined together, which may be call'd Conglomerate Glands, *that are easily distinguishable by their form and colour, which is different from the Muscles, neighbouring to them, and of which there is one that may be call'd* Temporal, *which in part covers them by its extremity. This heap of Glands appears there of the bigness of the neighbouring eye, and extending it self in length, continues its progress in the Orbite of the eye, below and in part behind the eye. Each Gland hath its little Lymphatique vessel,*

which parts from it at from a little Tear, and goes discharging it self into a greater vessel, that runs all along and under these Glands, and passeth into the Vesicle of the Gum, and terminates in the midst of the Articulation, which the root of the great teeth makes with the advancing corner of the said Orbite, and with the little Bone, which by its other end is articulated in the middle of the upper Jaw. This principal vessel, which being consider'd alone, is very little in appearance, but is not so in effect, seeing it receives the discharge of all the small vessels that come from each Gland, empties it self into the bag of the gume, and carries thither that Salival juyce, which may have qualities approaching to those of the Saliva or Spitle of man, or of the foam or drivel of divers other Animals.

The Nerve, which serves in the Nostrils to the faculty of Hearing, runs for some space along these Glands, which are also, as I have already said, small Veins and Arteries.

But having well consider'd the substance, quality & situation of these Glands, we judged their formation not to be in vain; but that their use, in all likelyhood, was, to receive the humidities both of the Brain, the Eyes, and the neighbouring parts; and that their discharge was very convenient, and even very

neceſſary to the parts, which receive that liquor; as well for moiſtening the ligaments of the great teeth, and to keep them in a condition of bending at ſuch time when the Viper will bite, as for bedewing and increaſing the teeth, which Nature hath formed and ſet in the midſt of this Juice.

For the reſt, examining and taſting the Glands as well as the Juice, we found a taſte altogether like that of the Gums, which Sign. Redi *hath deſcribed; namely, very near the taſte of the Oyle of Almonds, without all bitterneſs, though it leave, a while after, a little acrimony in the mouth, ſuch as may be diſcern'd in all kind of Spittle.*

I could add here, what I ſaid of the Salival Glands of *Snakes*, their difference from thoſe of Vipers; and I could alledge, that I believe my ſelf to be likewiſe the firſt Diſcoverer of them. But becauſe ſo prolix a Citation might prove tedious, and that thoſe that deſire to have more light therein, may eaſily find the reſt in the above-cited *Section* of my Book, I ſhall not tranſcribe it hither.

Mean time 'tis very eaſie to judge from my whole Diſcourſe, and from the exact Deſcription, made by me, of theſe *Glands*, and

and their neighbouring parts, that they were not known to me by *Phanty*. Their ſcituation very diſtant from that place *under*, and even from the ſides of, the *bottom* of the veſicles of the gums, ſhews ſufficiently, that they are neither *in* nor *under* the bottom of thoſe veſicles, as Sign. *Redi* hath pretended; and their great number makes it appear, that 'tis quite another thing, than the two litle Glanduls he ſpeaks of, and which are not to be found neither.

I intreat the Reader, well to conſider thoſe I have diſcover'd, as they are repreſented in my *third Cutt*, as well in that part where the Temples are of a Head cut, mark'd C, (where their ſhape and ſcituation is repreſented to the life, as they ſhew themſelves before they are ſever'd;) as in the incloſure of a Vipers ſceleton, which is there alſo exhibited; where he may ſee them in their upper and lower appearance, drawn out of the Head, and by their ligaments faſtned to the hind-part of the Eyes, and to the body of the Brain. I came not to the full knowledge of them till after much pains, and a very long and particular ſearch. I did not content my ſelf to ſeek a great while in the bottom,

and under the bottom of the vesicles of the gums; but, to find these Glands, I have flead and dissected a great number of Vipers heads, as dextrously and nicely as I could; and I have used all means well to examine them; among others, I caused many heads to be gently boyled in a little water, as well to consider the divers sutures of the skull, and to separate all the parts from it; as to remark well the form and the connexion of these Glands, to draw them out whole, and joined, as they are, to the Eyes, and to divers bodies of the Brain, to which the marrow of the Spine is annex'd, and to have all these parts entire, and such as I have caused them to be engraven.

Me thinks, that all these cares, follow'd by so good success, may well deserve, my Discovery of this great number of Salival Glands with all their vessels, should not be envied me by Sign. *Redi*; considering I do sufficiently appear to him incapable of envying him any of those fine things, he hath already found, or may find hereafter in his curious re-searches.

There remains no more for me to do, me thinks, than to satisfie Sign. *Redi* as well concerning the Uncertainty, wherein he is touching

touching the Power of the Volatil Salt of Vipers for the curing of their bitings; as about the Objections, by him made against my Experiments of the Head and Neck of a Viper, for curing Doggs bitten by it, and which I have also thought should be efficacious to cure men in the like case.

He opposes nothing to the Vertue of this Volatil Salt, but that he remits the Reader to the time he will take Chymically to prepare this Salt, and to make the Experiment therewith. But he saith, that he hath made many tryals with the Heads and Necks of Vipers, and found first; That, having made two great Doggs aforehand to swallow, each the head and neck of a Viper, and, afterwards caused both of them to be bitten by other Vipers, those Doggs dyed not: And that, having caused to be bitten two other Doggs of the same bigness, that had eaten neither head nor neck of a Viper, they dyed neither. He saith further, that having made a Pullet to swallow one head of a Viper, and a Capon two, and caused them to be bitten, they both dyed soon after. He adds, *that* having the next day made ready some heads of Vipers, he caused them to be forc'd down the throat of two little Doggs, of which he caused

the least to be bitten in the legg near the *Anus*, and the other, in the tongue; and that they both dyed; *That* he made the same Experiment upon eight Pullets, two Kitlings, two small Rabbets, and six Pigeons, even with rubbing the place bitten with the blood of the Viper; *That* also the six Pigeons were bitten by the heads of Vipers, dead several dayes before, and that all these animals dyed; *That* lastly, he had fed two Pigeons for three dayes with the flesh and broath of Vipers, and being bitten thereupon, they dyed likewise, this aid notwithstanding.

For Answer to all these Experiments, I make use of the same *Generals*, that Sign. *Redi* hath done against mine, which are to be found *pag.* 16. of his last Letter; where he saith: *That* a Viper more easily kills lesser Animals by his biting, than great ones; that, according to the bigness of the Animal bitten, and according as the place wounded is more or less provided with veins or arteries; that, if from the wound of a Viper much blood issueth, the Animal not only dyeth not, but does not so much as feel any great inconvenience; that it also falls out sometimes, that the Animal bitten escapeth, after it hath endured ma-

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ny mortal ſymptoms; and that this may come to paſs by the ſole aſſiſtance of Nature.

As to the two other *Generals*, which he alledgeth in reference to the letting in of the yellow liquor; I did not think fit to alledge them here, *both* becauſe I agree not as to the poſſibility of the fact, *and* that I have elſewhere declared my ſelf ſufficiently about it; as alſo that they make not to this purpoſe. But I think it more material, to add here two other *Generals* to thoſe of Sign. *Redi*, and to ſay: That the biting is more or leſs noxious, not only according to the place bitten, but according to the degree of the Viper's being vexed when ſhe is to bite, and according as her teeth have more or leſs penetrated. And reaſoning particularly upon theſe experiments, I ſay, *that* the dogs which I had cauſed to be bitten every one thrice, & were cured by making each of them ſwallow the head and neck of a Viper, were of a very midling ſize, *that* it is very difficult to found a certain judgment upon the great ones, which Sign. *Redi* hath uſed, as 'tis alſo, to paſs it upon them that had ſwallow'd the head and neck of a Viper, and thoſe, that had not done ſo, *that* all the other little animals, which he employed, as well the Pullet and the Capon, as the Pigeons, Catlings, Puppies, and little

A Rabbets,

Rabbets, had not of themselves strength enough to resist for a time the enraged spirits, nor to find the effect of this remedy; especially that which was bitten in the tongue. For, I firmly believe, that there is no animal, great or small, which being fiercely bit in the tongue by a Viper ill vexed, can avoid death, what aid soever you minister to it, because of the nerves, veins & arteries, disseminated through the tongue; and because that the angred spirits finding a free entrance, produce there all the effect they are capable of, with so much violence and nimbleness, that nothing is able to stop them. But in all curable bites I shall not easily be induced to renounce the help, which may be given by the head, neck, heart, liver, and divers other parts of a Viper (especially of her that made the bite) for the cure of the animals that have sufficient strength to resist a while, and to expect the benefit of this kind of remedy. I believe also to have great cause not to exclude from it man himself; as also to prefer the parts of the same Viper that hath bitten, to those of others; because they must needs have greater congnation and more consent with the vexed spirits, that issued from her. Concerning which I think it not amiss, to impart to the publick an accident that happ'd in the Royal Laboratory of this City, whilst my last experiments were making.

A young man that had made a good progress in his studies, desirous to perfect himself in both ways of Pharmacy, and chiefly addicted to my course of Chymistry, was near me, in the midst of a great Assembly, on the 2d day of my experiments. After I had made some, whilst I was entertaining the company, the fancy took him, in imitation of me, yet without my knowledge, to take a Viper with his hand, and to seize on her head: which he did not with that caution that is necessary, as not holding her so fast but that the Viper took her opportunity, and struck one of her great teeth very deep into the middle of the upper part of his left fore-finger. Having been made acquainted therewith, I remov'd, as much as I could, all fear from his spirit, and advised him to betake himself to the necessary remedies. The credit he gave to the truths contain'd in my book, often read by him, induced him to say, that if I thought well of it, he would eat the head and neck of the Viper that had bit him. Commending his courage, I seconded his good inclinations; for, I caused slightly to be broiled on coals the head and neck of the said viper, and made him eat and swallow it hot, in the midst of the company, adding to it the heart and liver broiled likewise. After which I said, I doubted not but what he had done would be sufficient to cure him; yet to be the

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furer, I would give him some volatil salt of vipers, especially he being a person whom I did much esteem, and for whose health I had and ever should have a great concern. I thereupon immediately gave him a dose of fifty grains of this volatil salt, dissolved in four ounces of water, and assured him there was not any danger after this. The young man remained in the midst of the company, & stirr'd not from the place, till the meeting ended, and then he took a little fresh air. He was afterwards a couple of hours in the Royal Garden and the Laboratory; during which time he now & then found some little sickness about his heart; but being come to his own lodging, he was ready to sup as he was used to do, and would have done it, if I had not thought it better for him to take another dose of the same volatil salt, which had so good effect, that the next day, after he had dined well, he came again to our meeting; which did much surprise all those that had been witnesses of the bite. Since that time he hath ever been very well. Now though his wound appear'd much deeper then that of the German gentleman, that was bitten the 1st day of my former experiments; yet had he none of those grievous accidents, that befell *him*, & were by me described in my book: for he had no other pain but that of the hole of the bite, nor had he so much as a Fever. The wound

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only rendred some drops of blood, by means of the ligature, I caus'd to be made on the top of his wounded finger, which did never swell, and heal'd up as if it had been made by the prick of a pin, without any Cicatrice appearing; so far was it from a Gangrene, or Scar, as some fancied he would have.

The thing hath been too publick, not to be credited every where; and I think not, that Sign. *Redi* himself will doubt of it; but rather that all things have concurr'd together to verifie all I had advanced in my book, of which he hath contested some particulars, and could not resolve himself about others. However, if he have by him any remedies, more quick and more sure for the cure of the bites of Vipers, the publick will be much oblig'd to him when he shall please to impart them, as I very willingly communicate these I have experimented. I shall not speak here of divers Experiments lately made upon Vipers by very able persons at *Paris*, which confirm not only the perfect innocence of the yellow liquor that is in the vesicles of the Gums, but which warrant at the same time my adscribing the venom to the enraged spirits. These truths will be better received from their hands, and they will be much more advantagious to me, than if I did attempt to publish them now. For doubtless there will be found in them very

ascribing to me the obligation, which the publick will owe them for it.

For a conclusion of this discourse; *since* Sign. *Redi* hath not found in the whole body of a Viper any other part but the yellow juice to which he can assign its venom; *since as my part* by the new experiments, he hath desir'd of me, I have sufficiently justified the innocence of the yellow liquor in the Vipers of *France*, and the great conformities there must needs be in the same with that of the Vipers of *Italy*, asserting withal the venomousness of the angred spirits causing the death that ensueth the bite; and *since* lastly the Vipers of *France* do kill as soon and in the same manner as those of *Italy* do, and even without any intervention of the yellow liquor: These things being so, I esteem, that Sign. *Redi* would do very well, if, to satisfie *on his part* the expectation of the publick, and without adhering any longer to the yellow liquor, which is so reasonably contested, he would take the pains to labour to find out some new subject, that might be common to the Vipers of *France* and those of *Italy*; that might have the same disposition of matter, and the same

fully exclude from it the enraged spirits, as I now exclude from it the yellow liquor. But if on the contrary it comes to pass, that he can find none other, I believe not, that for the future he hath any ground to maintain his opinion, no more than to contest mine.

Concluding this dissertation I shall say, that the contrariety of opinions, which is between Sign. *Redi* and me, in the most essential things of the Vipers poison, may also be observed upon another account about the same animal: For, the more *he* expresseth p. 39. of his last letter, the aversion and hatred he hath against it, the more I esteem it, and the greater pleasure I take to handle, to examine, and to prepare it. Nor can I sufficiently praise the excellent qualities, which so rare a subject possesseth, nor the admirable remedies which it furnisheth: Which are the considerations, that have heretofore induced me, and oblige me still to call the Viper one of the chief Pillars of Physick.

It may be, that for this once Sign. *Redi* will not doubt but that a discourse as rude as this, compos'd among coals and furnaces, which I have seldom quitted of late, is mine. He will doubtless judge, that if more understanding men had put their hands to it, the reasonings thereof

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should be more subtile, the style more polite, and the expressions more elegant; and the *Greek* and *Latin* quotations would not have been spared therein, both to strengthen the arguments thereof, and to adorn & enlarge the volume. But for all the contrarieties, which the different conceptions have bred between Sign. *Rédi* and me, I shall always have a very great and a very disinterress'd esteem for him; and so much the more, because I have great reason to conceive some good opinion of my book, since it could deserve that so intelligent & famous a person hath vouchsafed to read it again and again with pleasure, as he saith himself, that he hath taken the pains of transcribing many pages out of it word for word, and hath made it famous by his answer, and by that also which a person of great parts, and a high reputation hath made to it, address'd to himself on this subject. I cannot but much glory in it, and highly declare my self his obliged. And if it should come to pass, that the diversity of his experiments, the force of his arguments, or the esteem he hath acquired among the Learned, should carry the bell from me in the spirits of all the world; the victory, which he should thence obtain, would not be much less advantagious for me, then if the truth of my experiments, accompanied by my reasonings, had been able to ballance or even to prevail over his Sentiments and the writings of so Illustrious a Person.

FINIS.

